



Science and Technology Committee

Corrected oral evidence: The science of Covid-19

Friday 17 July 2020

3 pm

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Members present: Lord Patel (The Chair); Baroness Blackwood of North Oxford; Lord Borwick; Lord Browne of Ladyton; Baroness Hilton of Eggardon; Lord Hollick; Lord Kakkar; Lord Mair; Baroness Manningham-Buller; Baroness Rock; Baroness Sheehan; Baroness Walmsley; Lord Winston; Baroness Young of Old Scone.

Evidence Session No. 15

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Questions 140 - 158

Witnesses

Sir Patrick Vallance, Government Chief Scientific Adviser, Government Office for Science; **Professor Chris Whitty**, Chief Medical Officer for England, UK Government's Chief Medical Adviser and Chief Scientific Adviser, Department of Health and Social Care; **Professor Nick Phin**, Deputy Director of National Infections Service and Incident co-director for Covid-19, Public Health England.

USE OF THE TRANSCRIPT

This is a corrected transcript of evidence taken in public and webcast on www.parliamentlive.tv.

Examination of witnesses

Sir Patrick Vallance, Professor Chris Whitty and Professor Nick Phin.

Q140 **The Chair:** Good afternoon, everybody. Welcome to this afternoon's session. I particularly welcome our three witnesses: Sir Patrick Vallance, Professor Chris Whitty and Professor Nick Phin. Thank you for making time to join us today.

Before we start, I have to let you know that we are not only broadcasting on parliamentlive.tv today but apparently are live on the BBC Parliament channel. It must be because of our star witnesses.

I understand that none of you wants to make an opening statement, so I will go straight into the questions. The first question is straightforward. It is about how the scientific evidence is presented to the Government. We and the public understand that SAGE gives the science advice, but it also gives the advice when asked. Who in the Government asks SAGE to give advice? How do they decide what advice they need? Do you have feedback to SAGE and other committees as to how that advice is used?

Sir Patrick Vallance: It is important to understand that there are multiple inputs of science into government. SAGE is the group that is pulled together for emergencies. Traditionally, it is called by COBRA. The output from SAGE would then go to the Civil Contingencies Secretariat and to COBRA for ministerial decision.

SAGE does not have a fixed membership. It has participants who may vary between meetings, depending on the subject. In this emergency, it has gone on for 47 meetings, which is extremely unusual for SAGE. Normally, it is two or three meetings. For example, we had one meeting last year for Toddbrook dam and many more around the Salisbury event, but, even so, nothing like the number we have seen now.

The membership changes. The members who come from outside government are independent scientists who are not paid and not contracted, and are therefore absolutely free to speak their mind and give their opinion unrestricted.

The way we get our questions is threefold. First, they come through Cabinet Office. There is a formal commissioning process, whereby questions come into SAGE on matters that the Cabinet or, when COBRA is stood up, COBRA would wish to know the answers to. Secondly, they can come through departments. For example, on aspects of information about schools and Covid, specific questions might come directly from the Department for Education. They still go into Cabinet Office, but questions will come from a department into SAGE.

Thirdly, of course, we ask our own questions. Very often, topics come up that we think are important and need to be looked at. They are the sorts of things that we have pursued quite heavily during this, such as on immunity and immunology, where we have asked questions that are highly unlikely to come from Cabinet Office but come from members of

SAGE and from our own work. Questions on the science of transmission are things that I think we would drive ourselves. For example, we set up a working group on nosocomial transmission, care homes and so on. Those are things that we would set up ourselves rather than waiting for a question to come from Cabinet Office.

Those are the three major routes by which questions come into SAGE. SAGE will either deal with the questions itself as a group, but more often the questions go to sub-groups of SAGE. We have a number of sub-groups, populated largely by academics from different backgrounds, which range from modelling to behavioural science, to specialists coming together to tackle problems on transmission, to clinical groups and others, including genetics. There are a number of groups that look at the questions.

On the process of the feedback, when we meet as SAGE, Chris or I, or others occasionally who have been in meetings, give a general commentary at the beginning of the meeting and a situation update, and some of the outputs and how they have been used may be discussed as part of that. The chairs of the sub-groups are all on SAGE and are therefore in a position to feed back to their sub-groups, where appropriate, anything that is relevant to the work of that sub-group.

In outline, that is how SAGE works and how we get our questions. If I may, I will ask whether Chris wants to add anything, because he has been in government and been on SAGE for a longer period than I have. He may have other comments.

The Chair: I was about to ask Professor Whitty whether he had any comments to add.

Professor Chris Whitty: There are only two, or maybe three. The first is that the great majority of science advice to government does not come through SAGE. It is important to realise that it is not the only route. The SAGE mechanism, which was originally set up largely under Sir John Beddington and his successors, was a vast improvement over what was there before.

It allows for lots of groups to feed in and for several science disciplines and individuals to challenge one another, but then a unified view to be presented to the Cabinet or to COBRA. You get a variety of views embedded, but you do not get an indigestible group of opinions thrown into a Cabinet meeting. You get a single consensus view, with whoever is presenting it saying how wide the variation is around it.

Some of the sub-groups that Patrick talked about were set up just for this SAGE, but several of them are standing scientific advisory committees. For example, the NERVTAG group is a standing advisory committee that looks at respiratory infections and is made up of independent scientists from around the UK. It exists between emergencies, irrespective of SAGE.

Professor Nick Phin: Public Health England both sits on SAGE—we put some of our experts on to that group—and prepares a number of the papers that contribute to the discussions in SAGE. We also contribute to

NERVTAG, which is one of the groups that Professor Whitty was referencing. We are there as a source of advice to any other groups that may need it on relevant matters.

The Chair: What is the role of the biosecurity group now vis-à-vis SAGE?

Professor Chris Whitty: The new JBC group will be doing much of the operational work, in collaboration with Public Health England, pulling together the epidemiology and providing information on a day-to-day basis. What it is not doing, at least in its current form, is the job that SAGE is doing, which is pulling together science from multiple disciplines for the wider epidemic. It is very much where the science will be fed in.

For example, at the moment we are trying to identify hotspots of infection and making sure that we get them properly delineated so that the best advice can be given locally. That will be the JBC, the Joint Biosecurity Centre, and PHE, Public Health England, in England, with equivalents in Scotland, Wales and Northern Ireland. The larger science questions will still come through SAGE.

Sir Patrick Vallance: That is a very important distinction. SAGE is an advisory group. It is not an operational group. It is not a management group. It is not formulating policy. It gives science advice on topics that cross departments and are of major importance during the emergency.

JBC is a science operations group, and there are many around government. JBC is much more akin to the function of Public Health England, as Chris has laid out, in being able to identify hotspots and where numbers are going in the wrong direction, linked closely to operational delivery and action. That distinction is really rather important. There are many such operational science groups and other science groups around government, as Chris has said.

Professor Nick Phin: PHE has some statutory responsibilities with respect to public health. We are working very closely with the Joint Biosecurity Centre to offer the benefit of our experience and expertise to assist it in this matter.

Q141 **Baroness Young of Old Scone:** We have already heard a bit about how SAGE deals with uncertainty in the scientific evidence communicated to the Government. Perhaps you could describe how the process deals with uncertainty and how that is taken forward in the advice that you give to government. How is that uncertainty communicated to government? Is there any danger of groupthink as a result? How do you deal with iconoclastic views that are coming in from left field that may have some validity?

Sir Patrick Vallance: Almost everything we have been dealing with in this crisis has been about uncertainty. It was a brand new virus, and knowledge of it was non-existent last year. Although it is in a class of viruses about which things are known, there was nothing known about this one. Uncertainty is very often what SAGE has to deal with. Indeed, it is very often what science advice to government needs to deal with. It is the expression of uncertainty that is crucially important.

On that point, it is very obvious that there is no such thing in this crisis—indeed, usually in all aspects of science—as absolute certainty: “Here is the immutable scientific truth. Take it”. It is about a scientific process that learns and grows in information, and the expression of where we are during that process and the uncertainty that goes with that.

The way we deal with that in SAGE may be mathematical. There may be times when you can put some mathematical uncertainty around a problem and say, “Well, this is what we think is the answer at the moment, and here are the uncertainty boundaries around that”. More often, it is not that. More often, we express our output in terms of low, medium or high confidence in the evidence, and try to describe the evidence base. Clearly, to go back to a point that Chris Whitty made earlier, it is not helpful just to give a wide range of different opinions and say, “Here they are. Take your pick”. The point of SAGE is to try to coalesce them into a position with the uncertainty expressed.

You asked how we deal with differences and iconoclastic views. SAGE is full of senior academics. As you well know, the chances of them all politely agreeing on something are rather low. That is the point of SAGE: to hear different views.

An example that has been taxing lots of scientists in the UK and elsewhere over this period has been face coverings, where people have had strongly held different views. There are different lines of evidence that you would consider. Some favour the mechanistic work, where you look at droplet deposition on masks, transfer through masks, or air flow. Some favour more randomised clinical trials as giving you the answer to what happens in real practice. Some would say that actually it is the observational data; you introduce these into a new system and see what happens, whether it is a new country or a new time during an outbreak, and look at the outcome.

People hold strong views about the different information that comes from those things. Those are the sorts of discussions that form the basis of the SAGE debate that we come up with when we try to express at the end of it what we think the position is and where the outliers are, so that the range of opinion is clear to policymakers. As I said, what we will not do—I do not think it is helpful—is just to say, “Here’s a range of opinions. Take your pick”. We try to formulate them into an agreed position where we can.

Baroness Young of Old Scone: Do you believe that the questions you are asked by COBRA, or whoever, sufficiently expect a range of uncertainty, or are they sometimes couched in a way that asks for a single view to be expressed? Some of the modellers said that on occasions they were being asked for a single line on a graph rather than a range of possibilities. Is that because politicians cannot cope with ranges?

Sir Patrick Vallance: It is true that there is a process of making sure that the questions are right. We go through an iteration with the Cabinet Office to make sure that we get questions that are answerable and not overly precise. We reject things where somebody is looking for a point-

specific answer on something where we simply do not believe there is a point-specific answer. We do not go back with that. We say, "Look, this is not a possible thing to do. We will give you the range and the uncertainties", which I am afraid is the reality that needs to be dealt with.

Of course, many people would like to have a very precise answer: "Is it X or is it Y?" Very seldom can we deliver that. We go through a process of trying to make sure that the questions themselves are amenable to answer by scientific method.

Professor Chris Whitty: May I add two things to what Sir Patrick has said? First, still now and even more at the beginning of the epidemic, one of the points of uncertainty was, "We simply do not know". When the epidemic started, we did not know at all whether there might be any immunity and, if so, what sort. We did not know whether there might be people who were infected without symptoms. Part of what we had to say was, "These are things we cannot give you information on because there is actually no data, and therefore the uncertainty is complete".

Secondly, we may well be in a situation, and almost certainly will be, where we have to change the current view as new data comes in. That is a very important part of trying to get policymakers to understand the level of uncertainty they are dealing with.

On the single line point, to pick up your exact question, very often the difficulty is presenting very complicated data visually. Often, a single line has to be explained by the scientists in the room to the people who are making the decisions in order to avoid providing data that is not easily interpretable in the context of a decision-making process.

Baroness Young of Old Scone: Is any risk of groupthink caused by the need to develop consensus? Do you think that submerges disagreement in an unhelpful way on occasions?

Professor Chris Whitty: That risk is absolutely always there. It has rightly come up when people have looked at what has gone right and wrong in government on multiple occasions over multiple countries. Groupthink is one of the biggest risks.

It is very important that we have people inside challenging, but also people outside challenging. Personally, I strongly welcome that, when they do so in a way that provides logical arguments and data backed up by science. Those are extraordinarily helpful. Obviously, when they just turn into a rant, it becomes less helpful. It is enormously helpful having strong external challenge, as well as internal challenge.

Sir Patrick Vallance: I was going to make exactly the same point. It is important that we get external challenges. It was very welcome that the royal society set up various groups to try to look at similar things as well, and we worked to help make sure that got set up. We go to the other academies. The Royal Academy of Engineering has been incredibly helpful on things. The Academy of Medical Sciences' recent report on winter, which we commissioned, again helps to make sure that we get a diversity of views.

More than 100 scientists in total are involved across SAGE and sub-groups in different groups. There is clearly quite a lot of challenge in that system. In any system, groupthink is a risk. It needs to be guarded against, and I think external challenge is important.

As Chris rightly said, it is important that the external challenge, in this context anyway, is scientific and based on evidence and science. It is not terribly helpful to have external policy challenging the science, because those are different points, and that is not really the issue.

Q142 **Lord Winston:** Going back to something that Chris Whitty was talking about, we have heard that the modelling evidence produced in different countries is largely similar, but the interpretation of the evidence has been different. In what ways do you think the evidence has been interpreted differently in England compared with other countries, and why?

Professor Nick Phin: If I can use face coverings as an example, many of us are all considering exactly the same evidence. However, if you look at how that is actually translated into practice, you get some countries that are not even recommending face coverings, such as New Zealand, Australia and Sweden. In other countries, they are mandated indoors. In some other countries, they are a requirement for children and teachers attending schools.

They are all looking at the same evidence, but, depending on the cultural and societal norms, they translate it into a policy that reflects their society's norms. There is no simple solution. The evidence, I think, speaks for itself. However, it is the interpretation by policymakers that makes the difference.

Lord Winston: We have just been talking about face coverings. To what extent has this been interpreted differently in England? I am particularly interested to know whether, for example, a wet mask or a disposable mask is a danger. We see a lot of people wearing masks that we would regard as inadequate if it was a medical situation. Chris Whitty, what do you think about public acceptance of that aspect of limiting the virus?

Professor Chris Whitty: If we are talking about masks specifically, to build on what Professor Phin said, the stronger and clearer the evidence, the more similar the response tends to be. That is an observable fact across a whole range of different areas. You also have to translate it into people buying into it and understanding what they are supposed to do. You are right that there are important but relatively technical variations in the face coverings that are used by the general public.

Clearly, the kind of surgical masks you see in a medical situation, and even more the respiratory masks for high-risk procedures, are very highly regulated. We are talking about face coverings elsewhere. The variation in those is much less important than getting people to do the basics. The basics are that if you are going to wear one in a high-risk area, it must cover your nose and mouth. Wearing a brilliant mask covering only your mouth or only your nose will clearly have a very limited effect.

Lord Winston: Sir Patrick, is not the issue public acceptance? Surely, the biggest chance of getting public acceptance is if it is good for me, for my protection, rather than for other people's protection. Take track and trace, for example; unless you are able to diagnose the thing quickly and therefore treat somebody quickly, there is no great advantage in the person being traced. Is that not rather similar in a way to all the sort of protective things we are doing, where it might protect the rest of the community? How do we get that message across? It would be interesting to hear about that from both of you. Sir Patrick.

Sir Patrick Vallance: Yes, I can talk about that, and it is important that Chris or Nick talks about it, because it is obviously public health advice. You are right that many of the measures are about protecting everyone else. In that sense, it is similar to vaccination very often in creating protection for others. It is a classic public health issue, and communication needs to be clear about what benefit it brings. Face covering wearing is a classic one. There may be some protection to the wearer, but there is more protection to others. That has to be clear in the message.

One of the things that we have seen during this crisis is the extraordinary altruism and spirit of the British people to actually want to do things that help other people. Many of the measures that have been introduced are about helping each other. That is a classic public health issue that Chris or Nick may want to comment on, but you are right to ask the question.

Professor Chris Whitty: I support what Patrick said. The extraordinary altruism of the British public is what has allowed us to turn the tide on this for now, but there are very many things that we have to continue to do. A very important one, for example, is that if people have symptoms of cough, fever or losing taste or smell, they must immediately self-isolate with their household, if they have one, and get a test so that their contacts can be identified.

That is absolutely critical. It is an extraordinary, altruistic act. It is enormously inconvenient, and yet people do it. They do it, because they know that if they had the virus and they passed it on to a chain that ended up with a vulnerable person who then died or became very ill with it, it would be a very bad thing for society. The whole system relies on the extraordinary altruism of the British public, which they have completely risen to and will continue to do.

Lord Winston: That is the point, Professor Whitty. How can we stimulate that continued altruism?

Professor Chris Whitty: The key thing is that people have to understand why it matters. People need to understand the reason. Explaining to people why they must self-isolate with symptoms is relatively straightforward. Most people would understand: "If I've got an infection, I might pass it on". That is quite normal practice ordinarily. Explaining that the virus can transmit early on, before people get symptoms, is a bit less intuitive. Households have to stay in isolation and we need to find contacts so that they can isolate themselves before they get symptoms. People can very often become infectious two or three

days before their first symptoms appear. People need to understand the reason. If they understand the reason, the really clear evidence is that the British public will do that to benefit others.

Q143 **Baroness Walmsley:** How is scientific evidence balanced with other types of evidence, such as social or economic evidence, to make policy decisions? How is conflict between the different types of evidence resolved? Could you say who is involved in that process? To what extent are you, as scientific and medical advisers, involved in the process of balancing competing needs?

Sir Patrick Vallance: On SAGE, we have social scientists and somebody from the Treasury who attends from an economics perspective. As Chris Whitty made clear from very early on—he will speak for himself—the economic consequences of lockdown also have significant potential health effects. We have been very conscious of that as part of the discussions.

Outside the deliberations of SAGE, there is an entire economics team within Treasury working on this. It comes together, to answer your question, in the Cabinet Office bringing together the different parts of advice to formulate into policy options for Ministers. Very often Chris or I, or both of us, have been involved in those discussions in order to make sure that the advice from SAGE has been properly understood while the economic analysis and the economic side is presented.

The ultimate decisions of course, about how you make the trade-off and the balance between them, are for Ministers as to where they wish to take that decision. We try to make sure that the advice from both sides, or all the different areas, is properly articulated so that those decisions can be made. The Cabinet Office is where the integration of policy options comes together in most cases. It could be in a department, but normally it is Cabinet Office.

Professor Chris Whitty: It is important to add that for this particular epidemic we should be clear that there is an incredibly difficult balance that political leaders have to make. They are walking a narrow path. On one side, we could cause enormous unnecessary economic and social damage, with people being isolated, unemployment and all the things we read about in the newspapers, rightly. If we steer too far the other way, we could end up with the epidemic coming back and a second spike.

Walking that path is extraordinarily difficult. Of course, they have to integrate the social, the economic and the scientific and epidemiological advice. We provide the science and the epidemiology side, and some of the social side, but the economics comes from other areas.

As Sir Patrick says, almost invariably we will be in the room when the big decisions are going to be discussed. We can present the data, but then it is ultimately for the senior policymakers to integrate those very difficult and competing necessary points.

Baroness Walmsley: Sir Patrick mentioned a moment ago the Academy of Medical Sciences' report.

The Chair: Yes. Sir Robert Lechler is listening. He is our adviser.

Baroness Walmsley: That is right. I must say that I find it very concerning. Do the witnesses think that the processes they have just described are likely to change at all in emphasis, function or structure over the next six months if we have a second wave?

Sir Patrick Vallance: The process of integrating advice from different places will remain, I suppose. I think that is appropriate. The report we commissioned from the academy, which is a very good report indeed, laid out clearly the options that need to be considered for winter. That has far-reaching implications right the way across Whitehall. Chris and I wrote a letter after the SAGE meeting where we considered the report, drawing it to the very clear attention of lots of departments across Whitehall for them to start considering how they would respond to it. That is where the integration of the different sciences comes together, and policy will need to be—

The Chair: Is that letter in the public domain, Sir Patrick?

Sir Patrick Vallance: I do not think that letter would have been in the public domain, but there is no reason why it should not be. We simply drew people's attention to the report and asked them to look at it and consider it.

Q144 **Baroness Sheehan:** We have had it reiterated again that this is a new virus and we have all been on a very steep learning curve. Could the witnesses say what pieces, or types, of scientific evidence have had the most influence on the way the pandemic has been managed in England? What could have been the implications for the course of the pandemic if the evidence had been available, or indeed considered, earlier?

Professor Nick Phin: One of the factors that has been an important element is the realisation of the extent to which asymptomatic infection is present and the potential for people without symptoms to transmit the virus. Early on, we drew parallels with SARS and MERS—Middle East respiratory syndrome—which are derived from the same virus as the current Covid-19. We drew parallels with that, which, broadly speaking, concluded that people would tend to be infectious once any symptoms were present.

Now that we have greater understanding, and it is clear that asymptomatic transmission occurs and that people are asymptomatic, there is a significant change in the approach that we have to take. We have seen that in the way personal protective equipment is now being recommended both in healthcare and in other settings. I think that has been quite a significant development.

Sir Patrick Vallance: There are lots of areas where that has been important and new knowledge has accumulated. I will highlight one. Quite early on, from money that Treasury made available to Chris Whitty and me, we funded a genomics consortium to start looking at the genomics of the virus. That turned out to be extremely important for being able to see the origin of different outbreaks. Were they linked? For example, were hospital outbreaks due to patients catching it inside hospital or were they from outside? It became important in knowing

where the importations to the UK came from. One of the things that was seen as a result of that work was that the seeding of infections in the UK largely came from importations from Italy, Spain and France, not from where people might have thought initially, which would be obviously China and the East.

That sort of information is important. It determines how we might behave on some of the activities. Importantly, the notion that you can use near real-time sequencing to understand outbreak relationships will be an important way in which it is managed. There are lots of examples like that where science has emerged quite quickly and has turned out to be operationally rather important.

Professor Chris Whitty: I will take an example from clinical practice, because obviously there is trying to prevent people getting the infection through managing the epidemic, but there is also managing the disease. It is clear now that we have learned a huge amount about how to manage it. There are things like proning, where people are laid on their front when they are very ill. There is the very important role of stopping people getting clots—thrombosis—which we did not realise at the beginning.

I would like to highlight the RECOVERY trial, which the UK ran right from the beginning. It was the largest trial of therapeutics in the world on Covid. It came up with the critical finding that the steroid dexamethasone, which is widely available around the world and very cheap, with a very well-known safety profile, significantly reduces mortality for people with severe disease. Knowing that will reduce mortality around the world, because that drug is available everywhere. That has been a very important change. I hope there will be several more to come. We are still continuing trials of therapeutics, as well as of vaccines.

Q145 **Baroness Sheehan:** Professor Phin, thank you very much for bringing up the asymptomatic issue. Colleagues will be asking questions on that. To what extent did evidence from previous pandemics, or pandemic preparedness exercises, inform the management of this pandemic?

How important has evidence on the role and efficacy of PPE and face coverings, which we have touched on, been for informing Public Health England's ongoing response to the pandemic?

Professor Nick Phin: Clearly the pandemic that we were all preparing for was a potential flu pandemic. Fortunately, there are many similarities between the way flu is transmitted and the preparations that one would put in place. Therefore, we had well-rehearsed and well-planned exercises where we tested our response and what we would do. We had a stockpile of personal protective equipment, which proved invaluable in this particular incident. Therefore, that preparation stood us in very good stead when the Covid-19 pandemic occurred.

We have relied very heavily on evidence produced by the WHO, and by colleagues across the world, about the most effective types or forms of PPE that we can use to protect our staff. It is really important for people

to be aware that personal protective equipment is probably the lowest of the hierarchies of infection control that we normally refer to.

The Chair: Is the comment you have just made quite scientifically based? It is the least protective against transmission.

Professor Nick Phin: Yes, it is. It is a recognised hierarchy where the environment is probably the most important factor—ventilation, structural design, et cetera. We then move into systems, such as cohorting and identifying patients so that you manage them separately. Then we move on to personal protective equipment, which, because you cannot be absolutely reliant on people using it well, can be one of the areas where problems arise. Having said that, the personal protective equipment that has been advised is to a high standard and is supported by both the Health and Safety Executive and colleagues in infection control.

Q146 **Baroness Rock:** Professor Whitty, you talked about the narrow path that we are walking when it comes to economics and health. I would like to come on, if I may, to the easing of lockdown that we have seen since mid-May. To what extent are efforts being made to balance the easing of restrictions with interventions that suppress transmission to keep overall transmission low? Is the effect on transmission being modelled each time a restriction is lifted?

Professor Chris Whitty: Some things that we started right at the beginning absolutely have to continue for a prolonged period of time, such as washing hands, isolation and household isolation. We have added to that contact tracing and, most recently, face coverings. There are distancing issues, which has been varied, but the reality is that distancing remains an important part of the mix. How it is interpreted in different environments has evolved, but it has not gone away.

All of those need to continue for a long period of time. The things that have been removed are largely in the group of things with a different aim, which was not about isolating individuals but about trying to break contacts between individual households. Several of those have now been lifted—not all of them—and we have tried to do that in a phased way. The phasing was continuing, as the Prime Minister laid out this morning, with some things right at the end that we know from other environments—nightclubs are an example he gave—are associated with significant outbreaks.

We have to be completely clear about getting the exact balance right so that we neither stay overly locked down, with huge damage to families and their long-term health through that, nor open up too fast. Some countries have tried that and they have appeared to maintain their level of transmission at a very low level, and it is continuing to go down in some cases. Others, doing quite similar things sometimes, have tried that and then there has been an upsurge in the virus subsequently.

We are obviously trying to go cautiously. The question is whether, with all the countermeasures that we have, and provided people are systematic about them and continue to do all those things, we will be able to continue to open up society and the economy without leading to R—the

force of transmission—going above one, and therefore going back to where we were.

Going back to a previous question and the comment about the Academy of Medical Sciences' report, I think—it is a very common view among doctors and scientists who have looked at this—that there is a group of things you could do probably for three seasons of the year, but it may be more difficult in winter because winter so benefits respiratory viruses. That is why we get flu, colds and coughs in winter.

We have to accept that we may be able to do things for a period, and it is possible that in winter we may have to do some other things. We have to be honest about that. I think the Prime Minister made that very clear this morning.

Baroness Rock: Sir Patrick, do you have anything to add? Would you give us a feeling of what assessments are made on community transmission? What restrictions would be introduced at a local or perhaps even a national level, as Professor Whitty talked about, going into the winter months?

Sir Patrick Vallance: Let me deal with the science aspects, and then ask Chris or Nick to deal with the practical aspects of what will happen. The first thing is that as you release measures, as Chris said, it is inevitable, as you get more contacts, that you will see more cases. That is what happens. That is therefore a consequence of anything that is done to release measures.

At the moment, we are in a position where things are staying low and they look okay, but looking around the world I do not think you would rest on your laurels and assume that will be the case. The critical question is measurement and detection as early as possible, and understanding how to react to it.

The model that you can see around the world, and here, is that the most likely thing is that an increase in local outbreaks, and those local outbreaks may be very local. You need to act on those quickly and deal with them in a way that is proportionate to whatever has happened, so that you do not end up with widespread lockdowns or measures to try to deal with them across the whole of society when in fact the problem is local. That, I think, is the way it goes, but, as Chris has said, come winter, the challenges will be very much greater, and of course there is a risk that it could also need national measures.

As to what you can look at, the R value is decreasingly useful as you get down to local levels, particularly when the incidence and prevalence of the disease is low. To give an absurd example, if there were only one person infected and they then infected five other people, the R value would be five, yet you would still only have six people. R jumps around when numbers are low and it is not very useful for local monitoring; neither are growth rates. You need to look at absolute numbers, incidence, prevalence and a number of other measures that you might take as surrogates of whether there is virus out there. That is exactly

what the JBC is set up to try to do. I will leave it to others to explain how that works as a system.

The Chair: Professor Phin, what involvement would public health have in local outbreaks?

Professor Nick Phin: We work very closely through our local health protection teams with local authorities, the NHS and others, first to identify surges in activity or outbreaks, and then working jointly with them to take measures to try to control them and stop them spreading. We have a local to national perspective, where at national level we provide specialist expertise and support, and the liaison and operational response is available locally.

A key point has just been made. As we move into the winter, and as things start to relax, the key point has to be early detection of surges and prompt action. That is what Public Health England and the JBC will be doing in the forthcoming weeks and months—early detection and rapid response.

Q147 **Baroness Manningham-Buller:** I want to ask the panel about the strategy for managing the pandemic. We have heard from the evidence so far that there is an expectation that that could change during the course of the winter, according to the Academy of Medical Sciences' report. How confident is the panel that we will continue with broadly the same strategy, amended at the edges during the winter, or are there going to have to be significant changes to the current strategy?

Professor Chris Whitty: The first question is: do we, over the next six months, end up with some very different tools at our disposal that will actually change our strategy? Obviously, the one that we would all love to see is that, in the next six months, we got an effective or fairly effective vaccine or highly effective drugs. Patrick and I certainly would be very surprised if that was the case, but very pleasantly surprised. We are working as fast as we can to achieve that, and clearly it would lead to a significant change of strategy.

The second thing is that we are learning the whole time, not just from our own experience but from the experience of other people around the world. Patrick and I both talk to our opposite numbers in many other countries to learn what is working and what is not—and to read a bit behind the headlines, because what you read in the newspapers and the reality are often quite significantly divorced from one another.

I would be very surprised if our strategy in four or five months' time was identical to the one we have at the moment. The bare bones of it will be the same. We will still want people to isolate if they have symptoms, and we will still have contact tracing. We will still want to have measures that protect others, like face masks. We will still need some local outbreak responses.

What we need to do in the wider strategy, and how we can do the maximum damage to the virus with the minimum of damage to our society, will evolve over time. Some of it will be learning from other

people and some of it will be as the science emerges. I think it will evolve. Our strategy now is quite different from what it was four months ago, and I think it will be different again in four months' time. Patrick may have a different view.

Sir Patrick Vallance: No, I do not have a different view. There is an overarching principle, which is to try to keep the levels of infection as low as you can. That remains the overarching aim until the time you have an effective therapeutic, when you might change that. Until that time, and particularly going into winter, it is incredibly important to keep levels low. Winter, for all the reasons we have alluded to, will be a very complex time. The vast majority of people who end up with symptoms may not have Covid; they may have something else. People are potentially going to be isolated for reasons that are non-Covid. It is a complexity that will be difficult to manage and may necessitate changing the way we think about various approaches.

Baroness Manningham-Buller: I have a couple of additional questions, one of which is to Professor Phin. Whatever the strategy is now—I am sure all three of you could articulate it—and with the expectation that it will change, are you confident, Professor Phin, that the co-ordination between you, the NHS, what you are hearing from the centre and from the new biosecurity centre is all, as I hope, well co-ordinated and working together? Could you confirm that?

Professor Nick Phin: The Joint Biosecurity Centre is a fairly new entity. We are working very closely with it to ensure that we have links and joint working, that we avoid duplication and, most importantly, that there is a clear line of sight between us about where the operational responsibilities rest.

We have seen the formation of a variety of closer links with local authorities through directors of public health. There has always been a very close relationship with health protection teams and local authorities. We are now building on that to make sure that we have the local to national perspective that enables us to take action quickly and promptly should issues arise.

Q148 **Baroness Manningham-Buller:** I can guess at the answer to my final question, but I would like to hear what the panel thinks. We have heard that some countries plan to eliminate "the virus". Is that a credible option at any stage, even with a vaccine and/or better therapeutics and earlier diagnostics? I am asking you to speculate, but I am interested in the answer.

Professor Chris Whitty: I had the privilege of working for many years with diseases that were slated for elimination, so I have thought about it quite a lot. It is very important, if we are going to talk about elimination, to be precise. Very low numbers of cases that get us absolutely as low as we can, as Patrick says, is what we should be trying to do. Elimination means something quite specific. It means zero cases, other than imported ones, and no onward transmission inside a country.

This virus has a very common syndrome; there is asymptomatic travel, there are millions of cases around the world, and it is very easy to transmit. Lots of countries have tried to keep it out but very few countries have succeeded. Trying to eliminate it, particularly if you are a highly connected country like the UK—London is probably one of the most highly connected cities in the world, if not the most highly connected—is quite optimistic.

The difference between elimination—zero—and very low is, in absolute terms and in terms of numbers of cases, very small but conceptually it is very big. Some of the people who are calling for elimination may actually mean good control, but in science it is important to be precise. Elimination means zero cases onward-transmitted, and for this disease that will be very difficult.

I draw to the Committee's attention that we have tried to eliminate or eradicate a very large number of diseases over the years. We have so far, in humans, eradicated one—smallpox—and we have tried on a lot of other occasions. It is not an easy thing to do.

Q149 Lord Mair: From a public health perspective, can you say more about the difference between managing the pandemic in a centralised manner, as has been done in England, and the benefits of decentralised management with greater involvement of local public health authorities?

Professor Nick Phin: It is important to get a balance. Overcentralisation can lead to people losing a sense of local ownership, and what we need at local level is co-ordination and working to common principles and guidance. What we provide at the moment is additional support if there is a surge, as was the case in Leicester where a team went to assist the local team in assessing the situation and came up with suggestions and recommendations. It is really important in local teams to have the liaison and good working relationships, without which we cannot translate policies or advice into action. The ideal situation is a balance between centralisation and good local engagement.

Lord Mair: We have already heard mention of the very important report from the Academy of Medical Sciences about the winter. Could you say more about capacity? Does the UK have the local public health capacity for more decentralised management of the pandemic when winter comes?

Professor Nick Phin: Winter comes every year, so we have well-established plans for responding to flu, norovirus and a variety of the other viruses that we tend to see creating problems both for the population and for the health service. It is fair to say, however, that if you looked at our accounts in Public Health England over the last six to seven years, you would see that the budget allocated has been reduced, probably fairly substantially.

That has meant that we have become more efficient and we are more effective. However, it has taken away the capacity for surge and resilience that we had perhaps several years ago. There is an issue about

how additional resilience can be built into the system, and that will be very important if we are to deal with surges in the future.

Professor Chris Whitty: I concur. That so much resource has had, rightly, to be put into the JBC is because we have not invested in health protection over the last several years in the way that would have been ideal to set up a completely good structure that would allow us to do that. We should all be honest about that.

I have one additional point. When you are at the beginning of a very large-scale epidemic, and it is the same broadly everywhere, a national response is usually the most effective way to deal with it. The more we get down to the later stage, with much lower numbers and very different problems in different places, the more local responses are absolutely critical. The national resources should be there to support the local response, but for most of the small outbreaks, which are very much to do with the particular environment in which they are produced, it should be local people—the directors of public health and local authorities—taking the lead, with support from national resources. It is absolutely critical that we do that.

I speak to the directors of public health every week. They are a really impressive group of people, but they need to be resourced properly to do what is, and will continue to be, a difficult job as this pandemic goes through.

Sir Patrick Vallance: I concur with what the others have said. It is worth reflecting that, as an example, the countries that invested heavily in their public health systems following the MERS outbreaks have done well; they had the right systems in place, so it is important to invest in those.

I agree with what has been said about the importance of local management and therefore the importance of public health on the ground in those places, with appropriate investment, at scale, that allows contingency planning. It will not be used at full capacity the whole time, but it needs to be there to get surge capacity when you need it, and that requires investment, which has not been there.

The Chair: Professor Whitty, being pedantic, is there a scientific difference between elimination and eradication?

Professor Chris Whitty: Yes. There is a very important difference. Generally speaking, elimination is taken to be zero cases for long periods in a geographically defined area; eradication is eradication around the world. Obviously, for elimination you have to eliminate virtually everywhere before you can even think about eradication. Quite a lot of attempts at elimination have started and been found to be very difficult.

To be absolutely clear, when Patrick and I and many other people say we want the lowest number of cases, we would be delighted if that was zero, but the question is whether strategically you are aiming to go for zero and keep at zero for this kind of disease. There are many other diseases where elimination is the right thing to do. Eliminating rabies was the right thing to do. Eliminating malaria from the UK was the right thing to do,

but this is a disease that has a very large number of differences from those kinds of infections.

The Chair: Sir Patrick, you said that we needed a stronger public health system. We are not going to get it soon, but are we likely to be able to strengthen it before the winter or if there is a second wave?

Sir Patrick Vallance: Again, that is really a question for Nick Phin or Chris Whitty. As Chris has alluded to, the investment in the JBC and the test and trace system tells you the level of resources required for the degree of surge capacity that you need and the capability you need for that; it is an important area of investment across public health.

The Chair: What is the investment in the JBC?

Sir Patrick Vallance: Chris or Nick might know the number, but I do not, I am afraid.

Professor Nick Phin: I am afraid I do not know the number.

Professor Chris Whitty: In the budget, it was about £9 billion.

The Chair: That is a significant amount of money.

Professor Nick Phin: This is something that some of us have experienced in medical education. When we start to see assumptions made about reducing investment, or public health services not attracting investment, people tend not to go into recruitment or training. Once that happens, trying to reverse it is a big job. It is five to six years of training, so you cannot just say, "We need more consultants or scientists".

The Chair: We need more training.

Professor Nick Phin: Yes.

Q150 **Lord Kakkar:** I would like to turn to the question of a potential re-emergence of the disease later in the year and try to determine whether there is scientific evidence that speaks to that potential course in the natural history of the pandemic. To what extent is the current approach towards suppressing the disease that we are taking now, in July and August, impacting on that potential re-emergence according to any modelling or other information you have?

Sir Patrick Vallance: The re-emergence we are seeing now in many countries on the lifting of lockdown should not be seen as a second wave; it is a re-emergence of the first wave. The risk is that, when you still have levels circulating and you release measures, it comes back.

The question of whether there will be subsequent waves is, by definition, an unknown, but everyone I have spoken to thinks it is highly likely that the disease will continue to circulate and come back in waves, and it may well be seasonal. Perhaps some of the things happening in the southern hemisphere now might support that. If it is the case that it goes around the world and comes back again, we remain as a population exposed to it; we are vulnerable to it. Therefore, measures to reduce contact and spread—the sorts of social distancing measures we have talked about, and the hygiene measures that go along with them—will be necessary.

The modelling has suggested from the beginning that the risk of a second wave is high. There is a very significant chance that it will come back in force in the way the first wave did, and we need to be prepared for that, but we do not know. We are much better prepared in our understanding of the measures that need to be in place to try to deal with it, but we should be alert to it as a very high probability. Is it this year or next year? I do not know, but it is likely that we will see future waves.

Lord Kakkar: Sir Patrick, you quite rightly make the distinction between re-emergence of the first wave and a new second wave at some time in the future. How does the epidemiology of the disease over the coming months, and the approach that has been taken to suppress the disease and take the brake off lockdown, inform or help us predict what an early re-emergence of the disease, potentially in the coming months, would look like? Is there any understanding of that?

Sir Patrick Vallance: I do not think we have a clear understanding of that. Chris may want to comment because it is very much his area. What is important is that the higher the numbers in circulation when you go into winter, the higher the likelihood you get a significant peak. That speaks to the importance now of getting our numbers down and getting on top of it with the measures in place.

Lord Kakkar: Professor Whitty, perhaps you could pick that up. In addition, what modelling evidence has been available to SAGE on the interventions, policies and guidance that could have the greatest impact in reducing levels of transmission in a specific re-emergence?

Professor Chris Whitty: I am going to take some examples because it is important to think about them in isolation. The first wave that hit us was on quite a broad front, which is one of the reasons we are where we are, and in trying to deal with it we had to do a very large number of things at a point when we did not fully understand all the forms of transmission of the virus. We now have to break that down into lots of different elements, because we have a trade-off in terms of the ideal things that have a very significant reduction in transmission but very little impact on society, and there is a kind of abatement curve between them.

There are important components of that, and I am going to use just one for illustration: schools. On the positive side, we are very confident that children do not very commonly get a severe form of this disease and very, very rarely die of it. One of the good things about this virus—there is virtually nothing else good about it—is that, relatively, it spares children, so we are not worried about children going to school because of safety. But a school is a way of bringing together lots of different households, and there is a very strong debate among different countries, which are taking different approaches—Germany, Scandinavia, China and so on—about the role of schools in transmission.

All of us agree that the education of children is absolutely critical. If we can send children back to school and it has little impact on the virus, we can probably do it relatively straightforwardly. We may, however, have a situation where, when children go back to school, we have to put in other measures to make up for that.

Each one of the trade-offs between different sorts of tools to reduce viral transmission comes at a social cost. That is putting together the optimal package for this particular virus. That optimal package may be slightly different, or very different, in the winter compared with other months. We do not know that yet because we do not yet have the data from it. Except in China, the virus started at the tail end of the winter and into spring, so we have not yet had a full 12 months to see how the seasonality works.

Lord Kakkar: In that context, perhaps we could look at the question of testing capacity and whether, in terms of re-emergence of the disease in a few months' time, there is sufficient capacity appropriately deployed to be able best to mobilise measures and interventions to prevent it from taking hold substantially across the nation.

The Chair: Professor Phin, you are involved with the biosecurity centre.

Professor Nick Phin: We are in a very different position now from where we were in January. It is important for people to be aware that Public Health England provides reference services and diagnostic services for new and emerging pathogens and unusual diseases. What we do not do is provide testing at scale. We were involved in the initial development of the protocols for testing for Covid-19. Those have now been developed at scale in the NHS, the private sector and academia, so we are much better prepared. The Prime Minister has today announced an expectation of half a million tests a day as we move into the autumn and winter time.

In addition, we are seeing additional methods being developed. One of the exciting possibilities is a study being undertaken in Southampton where they are looking at using oral fluid as a very rapid way of testing individuals. We have seen a better understanding of the virus influence some of the policies that we hope to adopt, which will be the frequent testing of potentially high-risk groups, and offering that more widely in the population—the idea being that we will detect people who are potentially asymptomatic, or pre-symptomatic, and can take steps to stop the spread much sooner than has been the case. There are a lot of things that mean that going into the winter we will be better prepared. Testing capacity will be one of those, and we expect to have the capacity to enable us to do that.

Q151 **Lord Hollick:** Sticking with the winter, what assumptions are being made about the transmission of SARS-CoV-2 in the winter months, and on what evidence are those assumptions based? What assessment is being made about the combined impact of winter respiratory illnesses and Covid-19 on the health system? Is there anything you would advise that we do now to mitigate that combined impact—for instance, expanding the flu vaccination programme?

Professor Chris Whitty: The evidence on the winter is indirect. As I said in answer to a previous question, we have not been through a full year in the northern hemisphere yet. Different respiratory viruses tend to have a slightly different seasonality, so we cannot be absolutely certain about it, but given that so many respiratory viruses are benefited by the winter,

including the common cold coronaviruses and many others, we have to assume that it will be benefited by the winter and then be pleasantly surprised if it is not. That is for good and obvious reasons. People are crowded together; ventilation is much less; they do not go outdoors as much; there is less strong sun; it is a colder temperature, so viruses are maintained longer in the environment, and so on. There are perfectly good biological reasons why that happens.

You are absolutely right. There is both a combined potential biological impact and definitely a combined practical impact. The NHS, like every other health service, is under much more strain over the winter months. That is due partly to flu and other respiratory infections, but there are many other things as well. It increases some cardiovascular disease; there are trips, sprains and all those sorts of things. The NHS is under greater pressures and the combination of those will be considerable.

You are absolutely right about flu. One of the things we can do, in addition to making sure that there is more capacity this year in winter, which was talked about by the Prime Minister today, is to expand the flu vaccination programme and make it as extensive as we can, probably extending downwards and upwards from the current ages, although exact age bands are still being determined.

There is a “but” to that. One of the things that has been very striking in some of the early data from Australia and the data earlier this year from Hong Kong is that, when people started socially distancing for the coronavirus, flu rates went down. It may be that some of the things we are doing for coronavirus have some benefits on that side, but I would not want to bet on it, so you are absolutely correct that we should be investing in the flu vaccination programme to the best of our ability this year.

Sir Patrick Vallance: I agree completely. The only other thing I would say is that we should think about drug treatments for flu and whether they get used more widely.

It may sound odd, but we do not have good evidence of the transmission routes of this virus; indeed, we still do not have great evidence on the transmission routes for flu either. Some work is starting on understanding transmission routes. That will be important. In winter, we are in different environments—indoor environments—so understanding the environmental conditions that facilitate transmission will be an important part of managing it over that period as well, but Professor Whitty has dealt with the medical aspect.

Professor Chris Whitty: May I add something, Patrick? I think someone might misunderstand your answer. We are very confident that droplets are important and that if you touch a contaminated surface and touch your face that is important. The ratios between different routes of transmission—droplets, touch and possibly aerosol in particular environments—are what we do not understand, but the broad routes are, I think, largely uncontentious.

Sir Patrick Vallance: That is absolutely right; those three routes are important. My point is that understanding them in specific environmental settings is important to understand, in practical terms, the transmission. But you are absolutely right. Thank you.

Professor Nick Phin: It is highly likely that we will see an increase in coronavirus. Each year, we see a surge in activity with the common cold, along with flu. Everything we can do to reduce a flu admission is one extra admission that might be available for another patient, so very active programmes around encouraging people to be vaccinated, and encouraging healthcare workers to get vaccinated, will be absolutely key. We are putting in place or enhancing surveillance systems for both flu and coronavirus to try to detect patterns or things that might enable policy decisions to be made.

To build on what Professor Whitty said, I have just received a report that says that Australia has seen a 95% drop in flu this season compared with last season. A lot of that will be attributable to the measures that have been taken to deal with Covid-19. We have some very tangible evidence that there are things we can do to control it.

Professor Chris Whitty: For those who are not aware of it, the flu season in Australia is the opposite way round in time of year, so that is now.

Lord Hollick: Professor Phin, you referenced the project in Southampton, which I understand uses the RT-LAMP method and is a saliva test. It is relatively inexpensive and it takes only 20 minutes to get the result. Do you see that being expanded around the country, so that we can have what a paper published by the Royal Society asked for, which is mass testing on a regular basis?

Professor Nick Phin: The study that is now under way in Southampton is quite exciting. It offers two things: a very simple way of getting samples to a laboratory; and the potential for a very rapid turnaround, which is what we need if we are to control transmission. Identifying cases early and isolating them to prevent further cases is the key. If we get the result a week later, we have missed the opportunity. That sort of rapid turnaround will be vital. If successful, it will be rolled out further.

Q152 **Baroness Hilton of Eggardon:** We seem to have moved into the testing and tracing arena. What is the evidence that test and trace will have an effect on suppressing transmission and reducing infection rates? What is your evidence for the effectiveness of test and trace?

Professor Nick Phin: Identifying cases and then identifying their contacts is a well-established public health measure that we deploy to control a number of infectious diseases. Being able to identify the cases and the contacts means that steps can be taken to stop transmission and ultimately control the spread in the environment.

One of the key issues alluded to in the previous response was getting test results quickly so that we can advise those who are positive and their contacts to self-isolate and prevent transmission. A paper produced by

the Royal Society suggests that the contribution of test and trace is around 5% to 15%, and that is on top of other measures such as social distancing and good hand hygiene. While test and trace has a contribution to make, it is not the only thing; we need constantly to emphasise social distancing and hand hygiene as important measures to be taken.

Baroness Hilton of Eggardon: The ONS data suggest that only about 25% of cases are being traced. Are you confident that it will be effective in light of that?

Professor Nick Phin: Twenty-five per cent is still a significant number. Clearly, there are opportunities. No project is static; it is evolving. This is a responsibility that clearly rests with the Department of Health, and I know work is going on to improve and enhance it.

Baroness Hilton of Eggardon: It has been described as a safety net underlying the release of people from lockdown and so on. Do you see it as an effective safety net or just a contribution?

Professor Nick Phin: It is a definite contribution. We must not forget the key measures: self-isolation for those who develop symptoms; people using social distancing; and hand hygiene and other measures to prevent both catching Covid-19 and spreading it to others.

Baroness Hilton of Eggardon: Sir Patrick, do you have any contribution to make on that point?

Sir Patrick Vallance: The only thing to add is that a high proportion of people appear to be asymptomatic. We still do not know exactly what the proportion is, but it seems to be significant. It is very difficult to identify those people and impossible for them to self-isolate, because by definition they do not know they have it. Identifying them through contact tracing is important.

The fact is that the current system is picking up whatever percentage it is, and it may be picking up a rather high proportion of symptomatic people. You would hope that by doing so you start to get a higher proportion of the asymptomatic people as well, because you are now containing them as contacts. As we start to test in high-risk environments where we know that spreading occurs more easily, or in high-risk occupations where people have much more contact and, therefore, a higher chance of getting it, we begin to pick up asymptomatic people as well. That is the trajectory we need to pursue in order to get on top of it. Obviously, it is particularly important that, where there are outbreaks, we get on top of it in that way as well.

Q153 Lord Browne of Ladyton: Still on testing and tracing, I want to explore what the science and the evidence tell us about test and trace capacity and how we should deploy it looking forward. Is there evidence to support the expansion of test and trace to first-degree contacts, or even to undertake backward contact tracing to go more deeply into any identified person who is infectious? Does the evidence suggest a role for pre-emptive screening—for example, identifying local populations or

high-risk workplaces—to try to chase down the infection?

Professor Chris Whitty: I will take each of those in turn. There is some evidence for all of them, but there is more evidence for some than others.

Backward contact tracing is, we think, an increasingly important thing to do, and the aim of the test and trace system is to be able to achieve that. One thing that is now much clearer but was not clear at the beginning of the epidemic is that the disease is passed on in clusters. The Koreans and the Chinese have demonstrated that really well. You might have a situation where the great majority of the transmission comes from about 20% of the people who get it, and the rest do not transmit very much; and it is a particular environment. Backward contact tracing to find those environments and go back to find who has been to those environments is something we should be aiming to do, and the lower the transmission rate, the easier it is.

The third question you asked—I will come to the first one last—was about pre-emptive screening in particular areas. We already do that in quite a number of environments; for example, people coming into hospital and people transferring to care homes are already screened. If there is an outbreak in a hospital, or someone is in a high-transmission setting, such as Leicester at the moment, we would recommend increasing screening, for example of asymptomatic healthcare staff. That is the direction of travel. How far we go on that, we are trying to determine at the moment. We are doing a number of studies on what the pick-up rate is and how much it contributes. There will be groups we want prospectively to screen, and there may be some particular high-risk groups. Without singling any out—this is just an example—we might think that for transport workers such as bus drivers or taxi drivers it is an appropriate thing to do, but we need to get the evidence. One of the things that can be slightly problematic is that lots of people say we should be doing this or we should be doing that, but we have to get the evidence as to what works. Doing it now when incidence is low, relatively speaking, is important.

On expanding to first-degree contacts, I think we now have enough evidence of pick-up to answer that question. If you had asked me a month ago, I would have been quite sceptical; I am much less sceptical now, but again we need to work out the groups where it is going to be useful. In test and trace, the first-degree contacts are already being isolated. They are contributing to reducing the transmission and protecting their neighbours when they are contacted and isolate.

The question is: what will we get in addition in terms of disease interruption by testing first-degree contacts? Is that going to give us greater benefit than we have with our current system? I think we will know the answer in weeks to months, but we do not know it yet. To go back to my first point, it is critical that we are evidence based, and that we base it on data and proper modelling, rather than doing it randomly. It is very easy to use an awful lot of tests and achieve very little if you are not careful.

Lord Browne of Ladyton: What does that say about capacity of testing and tracing going forward? What are the implications of that sort of thinking? Presumably, we would want the capacity to respond properly if the evidence revealed that it was the right thing to do.

Professor Nick Phin: Before I answer that, perhaps I could go back to a point made about contact tracing. Contact tracing is something we traditionally do for TB and other infectious diseases when we are trying to track down the source. One potential issue with Covid-19, which is why it is important that we pilot and test this, is that it is present for only a relatively short time in people who are infected. If someone has TB, for instance, they have it until they are treated, so you have a longer time to identify them. You can probably go back to first-degree contacts, but if you go back any further it becomes challenging, and we must await the results of the pilot to see how effective that will be.

I completely agree that if we are to go down the route of increased testing, both in high-risk settings and in groups, we need to ensure that we have the capacity to do it. I am aware that plans are being put in place to expand testing capacity. I believe the figure of half a million tests a day has been cited today as the target we are aiming for, but it is essential, if we are to implement these strategies correctly, that we have the testing capacity to back them up.

Q154 **Lord Borwick:** I want to ask about the potential impact of computerised contact-tracing apps on iPhones or whatever. Am I right in feeling that that is becoming less important now that in Britain the incidence is going down? Is it becoming harder to activate in Britain? Indeed, is there a computerised app that has your confidence at the moment?

Professor Chris Whitty: The short answer to the second of those questions is, at this moment in time, no, or we would have deployed one. The aim is to develop that. To be clear, I have not been involved in development. I am reasonably good on what you can use it for; I am much less good on how apps work. I suspect you are better than I am on that particular technology.

I think we should be aiming to have it as an additional part of our armamentarium. To go back to what I think all of us are saying in different ways, this virus will be dealt with only if we do a very large number of things. Having an app that is available, particularly if there is a surge or a new wave, or in winter, will be an important additional thing we can do to pick up cases early.

I am an old-fashioned public health epidemiologist; I am used to doing contact tracing the old way, and that was where we started. It is the development of very established practice, but apps are a new way in which we can do it faster and pick up contacts we otherwise would not know about. That is the big potential advantage they have, but there are operational and privacy issues that need to be completely sorted out before we can be confident that we can use them.

Sir Patrick Vallance: I agree. The two points Chris has raised are exactly right. It is about speed of contact and identifying contacts you

otherwise would not have realised had been your contacts—in other words, somebody who has been with you in an inappropriate environment for 15 minutes or longer. That is where this is going to be useful. All sorts of issues come with that, including privacy and technical ones, but the app could definitely be an advantage if it could be used in that way.

It is important to recognise that it would have to be very widely applied, because unless everybody uses it, or a vast majority of people, it is not going to add that much. Optimistic modelling says that, if 30% of people have the app, it will give you 9% more contact identification. That gives you a feel for it.

Lord Borwick: Should we use this period of the pandemic to develop the app, to make it more useful in the event of a second wave?

Sir Patrick Vallance: Yes.

Lord Borwick: The trouble will be getting people to take it up if they do not come across any infected individuals. If you persuade people to install an app on their computer, look at it and cope with all the privacy issues, yet they never actually come across anybody, they are going to object a little, are they not?

Sir Patrick Vallance: I do not know, but you are absolutely right that uptake is going to be the challenge. How do you persuade people to use it? How do you persuade people that their rights are protected, and how functional is it going to be? We need to use the time now to try to get it right. As Chris Whitty said, it is not as though there is an off-the-shelf one that is working very well somewhere else and being used at scale across a high percentage of the population. There is still a lot to be done, but it could be very useful if done properly.

Professor Chris Whitty: To be clear, several countries have versions and we should be learning from them as well.

Lord Borwick: Have we got closer to it than we were, say, two months ago, in your opinion?

Professor Chris Whitty: Yes.

Sir Patrick Vallance: Yes.

Lord Borwick: But we are not there yet.

Professor Chris Whitty: On your general point, my ideal would be that I would download it as a civic virtue and hope it never went off. This is not the time of year, with low incidence, when many people are going to be contacted by it, but the reason to have it is to make sure that the unknown contacts are contacted as early as possible.

Lord Borwick: Indeed, and that everybody is ready.

The Chair: Baroness Young, I think you were asking why we do not adopt apps that are already available. Do you want to comment on that?

Baroness Young of Old Scone: There are apps elsewhere. We seem to be struggling a bit with the technology to develop our own. Why do we

not just ask for somebody else's in the spirit of global co-operation?

Professor Chris Whitty: Of the three of us, I am probably the closest to this, but I am not very close so I think I would give you a bad answer. Rather than me giving you a bad answer, I am sure you could get someone who is much closer to the app's development. App development is not my skill.

The Chair: Professor Phin, do you have a comment?

Professor Nick Phin: I agree with everything that has been said. It is not an area I am familiar with; I am a traditionalist and very much in the same camp as Chris Whitty. One thing I would say is that those at highest risk of acquiring Covid as contacts are those who are usually known to the individual—in other words, household, work colleagues and close friends. One might get additional benefit from people who are unknown; there will be some, but it will not be as big as focusing on the high-risk groups.

- Q155 **Baroness Blackwood of North Oxford:** Professor Whitty, quite early in our session you said there is clear evidence that people will take action to protect others when they understand the reason why they are being asked to do things. As we move into the next phase of the pandemic, and we move from national action to localised action, that will become a more complex problem; for example, we are already seeing people in one part of Leicester being asked to do one thing and in another part they do not have to.

Providing the evidence and data down to that level, to explain and communicate very clearly the justification for those kinds of requests, will become even more important. We have had a few difficult moments with the pillar 2 tracking data, and with the PHE urgent review that has come out. I want to ask about confidence in providing the public with the data and information they need to understand why they are being asked to take action at local level as we move into the next phase.

Professor Chris Whitty: The data we are providing at local level is a lot better this week than it was last week, and it will be better next week than it is this week. When my public health colleagues—directors of public health and others—say that early in this epidemic and until relatively recently they were not really getting the data they needed, I think there is sufficient justification for them to say that. Increasingly, we are now able to provide the data to them at a very local level, as they need to understand it operationally. You can go on to Public Health England websites and get very good maps of exactly where the areas of high transmission are to a relatively high degree of detail.

We have tried to avoid, at the request of directors of public health and others, going right down to postcode level or other things that could lead to privacy issues, although that data exists. We are trying to make it clear, because people should know their own data around the area; it is a very fair ask and it is improving the whole time. The data is now there, and it is a matter of presenting it in a way that is intuitive so that people

can see their area and the areas around them and understand the data that is present. We would be keen to hear any feedback people want to give as to how to improve it.

Baroness Blackwood of North Oxford: Professor Phin, do you think that directors of public health in a local area would now be confident they have the data they need in order to operate effectively with the powers they have now been given, and in the way they would be expected to do by citizens?

Professor Nick Phin: I am much more confident now than perhaps was the case a few weeks ago. Throughout the pandemic, directors of public health have been supported by their local health protection teams that would have had access to some of that information and data at an early point. It has been a complex process. We have had to put together numerous data sources. That has been achieved fairly successfully, so I am confident, from what I have heard from colleagues, that they now feel they have most of the data they need to manage these situations.

Professor Chris Whitty: But I stress that, if a director of public health says they do not have enough data, we listen very seriously to that. I do not think we would want to brush that aside at all.

Baroness Blackwood of North Oxford: There was something that worried me there: "most of the data". If there are still bits that are missing, when do you think we will be in a position to say that local directors of public health and local authorities, which have been given the power to respond, have all the data they need?

Professor Nick Phin: Sorry. I may have inadvertently used the word; I meant the quality of the data. The data is there. With the data coming from NHS and PHE laboratories, over which we have a lot of control, we are assured of the quality. It is of a high standard. There have been issues about the completeness of some of the other data. It is not that it is not there; it is the completeness of some aspects of it. Nevertheless, what is being provided is sufficient to be able to judge whether there is an issue in a locality or a potential outbreak.

Baroness Blackwood of North Oxford: I want to follow up on the interaction between national intervention and local intervention, which is likely to be more relevant as we go into the winter, as we have discussed, and understand how those decisions will be co-ordinated. Just today, the Prime Minister has announced that the shielding programme will be paused. That seems to be an intervention that is likely to be reintroduced in the autumn. I would like to understand how the co-ordination will work effectively, given that some of the co-ordinating measures were quite challenging at the beginning of the pandemic.

Professor Nick Phin: This is one of the key roles of the biosecurity centre. It will be making those operational roles that we will be looking for in understanding and controlling local incidents. It will be the group advising on what measures should be taken and supporting the local response as we go forward.

Professor Chris Whitty: You asked specifically, Baroness Blackwood, about the shielding programme. That was initially designed around our quite limited understanding of risk factors, so it was relatively crude. We now have a much better understanding, due to research done in the UK and data from other countries, so we will be reviewing the way we do that and, we hope, risk-stratifying in a much more accurate way if we need to do it again. Obviously, we hope we do not. To go back to Patrick's point repeatedly, we want to keep to very low levels.

Professor Phin talked about the directors of public health, local authorities, PHE and the JBC. There is an additional, very important group from the professional side and for members of the public as well: GPs. If we are honest, we did not manage our communications with GPs ideally. We have learned from that and we hope we will do it better if we have to do another shielding version.

Baroness Blackwood of North Oxford: Given that, going into the autumn and winter, the decision-making will be more complex because we will be dealing with potential national and local measures, what lessons have been learned about transparency in the scientific decision-making process? It has stimulated a lot of public debate. We opened this session with a discussion on SAGE and structure. It is going to be more complex in the winter because you will have local decisions being made, you will have the JBC and you will have national interventions.

How can that be reflected in a model of transparency so that people can understand the scientific advice processes and the basis for measures that are very consequential for individuals, and we can maintain the level of altruism that has rightly been referred to?

Sir Patrick Vallance: We definitely made a mistake earlier on by not getting the SAGE minutes and papers out quickly. That was, in a way, an historic thing. SAGE has been a sub-committee of COBRA and, traditionally, papers did not come out until after the event, and then they were subject to screening in order to release them. For this, it was right to get the papers out and make sure that people could see the evidence on which decisions would be made; so that is an important lesson to be learned. As always, the speculation before the papers were released about what was in them, and who was on SAGE, was far more exciting and fruitier than the truth when the papers were out and people could see the nature of the scientific work behind it.

You are absolutely right that, going forward, the science advice side of it is where we need to get it clear, and out in a timely fashion so that people can understand what has informed policy decisions. As you know well, Ministers need time to consider things before the policy is formed, so it is difficult to do that well in advance of the policy, but we should try at least to get it out at the same time.

On the other aspects of local data, as Chris and Nick Phin have said, it is important that those data are there for people to be able to see the basis of decisions that will affect them more. Hopefully, we will avoid national decision-making for lockdown and it will be largely a local phenomenon, but the transparency point is important in all of that.

Professor Chris Whitty: I completely agree with Patrick that it was an error not to have got all the SAGE data out earlier. To alert people who are interested in data, the UK is very fortunate in that the Office for National Statistics and Public Health England data forms are excellent. Those who like data can lose themselves for hours in chart after chart and the basic data behind them on both those sites. I encourage people who want to look at data to look at it there. It is world-class and clearly presented.

The Chair: Does that mean that for future pandemics, or for that matter a winter second wave, we will be able to use the data for epidemiology-driven policy-making rather than modelling?

Professor Chris Whitty: I think that is a false dichotomy, as some of my colleagues from the philosophical side would call it. We clearly will need to look at straight data, and for outbreaks you do not need a model to tell you that there is an outbreak in a factory, hospital or town. Modelling will continue to be very important for trying to do forecasting; for merging data from different areas to do forward projections at an operational level; and to look at the potential impact of different interventions. Patrick may want to add to that. I would not want to see it as one or the other. I think we will have to use both for different things.

Baroness Blackwood of North Oxford: There is a proposal that we have had in writing that I would like to recommend to Professor Whitty and Sir Patrick, which is to consider the working protocols of the ACMD and the investigatory powers committee. They have been helpful in ensuring that there is public understanding of the workings of those committees, and they might be helpful for SAGE as well.

Professor Chris Whitty: Thank you.

The Chair: Baroness Young has a question related to the winter and a possible second wave.

Baroness Young of Old Scone: A couple of times during the evidence this afternoon, there has been a suggestion that as the level of the condition increases over the winter other measures may need to be introduced. Can you give us a feel for what those other measures are, beyond the ones we have already seen?

Sir Patrick Vallance: It is about the response needed in relation to what the outbreak is. That is really what people are talking about. It is not a whole load of newly invented ways of doing what we know needs to be done. In some ways, it is all very simple: breaking contact between people during times of an outbreak or an increase in numbers. How you achieve that may be somewhat different depending on the environment in which it occurs. I think the aim would be not to have very broad-brush, total societal lockdowns, but to think about where it is necessary to do things at local level and in a more sophisticated way to try to break the transmission.

Professor Chris Whitty: It is exactly that. It is about doing what we need to do to get on top of the virus with the minimum amount of harm.

That is the balance we have to strike all the way through. Minimum harm means the least damaging approach in the smallest area we can manage.

Lord Hollick: One of the things that has puzzled me—it goes back to the very first question about communication between SAGE and the Government—is that two of the organisations represented on SAGE, the Wellcome foundation and the Royal Society, both closed their offices a week or 10 days before the Prime Minister decided to lock down. Was that information communicated to the Government? Some behavioural scientists might comment that we need not only to listen to what the experts say but to watch what they do.

Sir Patrick Vallance: That was certainly known. As a point of clarification, it is individuals who are represented on SAGE, not their organisations; they are there as individuals. Yes, that was certainly known across government.

Q156 **Lord Kakkar:** I want to go back to the question of testing and whether there has been any analysis or modelling of the different testing strategies that have been discussed this afternoon and are being adopted in different jurisdictions around the world, and how those impact on the re-emergence of disease. It is about test and trace based principally on symptomatic individuals, versus looking at broad, population-wide testing on a regular basis for asymptomatic individuals, and varieties of strategies in between, and how those matters have been considered by SAGE.

Sir Patrick Vallance: Modelling of test and trace has been looked at quite a lot in terms of the degree of contact we need to identify and what impact that would have overall. As was discussed earlier this afternoon, we should not think of it as a panacea that solves all the other issues; you need to keep the other things in place.

The modellers' model was based on 80% identification of contacts and then built on the impact that would have on the overall outbreak. Rather usefully, they have put that into the context of a variety of other measures. One of the problems with this approach is that you can always look at an isolated thing and say, "Yes, that's useful", or, "Oh no, it's not harmful to reopen this or make that change". But this is a system-wide problem. You need to be able to integrate the effect of the change you are about to make in the context of all the other changes that might occur. What they have usefully done is look at test and trace in the context of other changes as well. We have quite a lot on that and it reinforces the importance of it as a very key part.

Others, as you are aware, have modelled total societal testing, but those things are not possible at the moment. As Nick Phin has alluded to, LAMP technology may allow that sort of thing to be possible; it may be much easier to do it, but we are not there yet on the practicalities of that approach.

Lord Kakkar: Does the modelling suggest that that is a reasonable target to pursue in terms of technology? If the technology were available, might that broader-population approach be justified?

Sir Patrick Vallance: We do not have good comparative models on the different ways to do it. Of course, it is a difficult one at the moment because the incidence is low.

Professor Chris Whitty: To conceptualise it, we started off with very few tests for a number of reasons, largely technical, and we have expanded them. When we had very few, there was a bunch of things we absolutely wanted to do but could not because we were limited by the number of things. You go out from the things you absolutely have to do, starting with diagnosing severe patients and then milder patients, and then to healthcare workers. The further out you go from that, the less clear the evidence tends to be, but we are moving out through those concentric circles. To take asymptomatic testing of healthcare staff, for example, the question is not whether you should do it; it is simply about frequency and who you should first target it on.

The question about whole-population screening is quite controversial. There are models that suggest it is useful, but others think those models are at the more speculative end. On the other hand—leaving aside the question about whether whole-population testing is the appropriate thing to do, which I think needs to be demonstrated because it is a huge undertaking, which does not mean it is the wrong thing—one thing we do need, and LAMP might be able to help us with, is much faster testing.

We have good systems for testing people who come in for elective treatment in the NHS, but we want things that can give us very fast turnaround, so that if somebody comes in as an emergency you can isolate them, test them and then release them if the test is negative. That relies on the test having very high sensitivity; otherwise, that effect does not work. In those kinds of areas of rapid testing, LAMP may help us in those environments, possibly.

Q157 **Lord Winston:** When we saw Chris Whitty and Patrick Vallance in front of the camera with the Prime Minister, there was a huge breath of relief, certainly among my colleagues, to see you in front of the public in that way. We congratulate you on how you managed a very difficult task.

With scientific issues there are so often debacles—take nuclear waste and crops that have been modified genetically—and constantly we do not seem to get the trust of the public. Here, public trust seems to be critical. Baroness Blackwood has just mentioned this, but could you very briefly give some indication of how you think we can encourage public trust in such an important issue in the future?

Sir Patrick Vallance: It comes down to openness, clarity of explanation and providing a clear link between what the science advice is and its implications for policy and operations. That link is quite important.

Professor Chris Whitty: To add a positive point, if you look at polling data, trust of scientists—not government scientists but scientists—is very high, and that is something we should make use of.

Q158 **The Chair:** Every country in the world, and certainly European countries, will be thinking about the winter and a possible second wave. How much

collaboration or communication is there between us? Are you talking to them?

Sir Patrick Vallance: A lot, is the answer. Chris and I spend a lot of time speaking to colleagues from other countries. We have a big session with colleagues from Japan on Monday or Tuesday next week. We speak to our counterparts in various European countries a lot. Needless to say, everyone is dealing with exactly the same issues, as you say. In January, I set up a call with international chief scientific advisers, which the US then took over. That has been meeting on a regular basis throughout, with chief scientific advisers from 30 or so countries.

Professor Chris Whitty: In addition, I speak with colleagues from the WHO's Euro region, our neighbours, and the WHO as a whole brings together, very usefully, public health leaders from around the world. I am in contact with my CMO colleagues in the four nations of the UK, usually on a daily basis in one way or another. We certainly stay very closely in touch.

The Chair: We have run out of time. My colleagues still had lots of questions and I stopped them asking some, which I am sorry about. You probably also wanted to tell us more. I am very sorry we have run out of time. Thank you very much indeed for coming to help us in this session today.