



Select Committee on Science and Technology

Corrected oral evidence: The science of Covid-19

Monday 29 June 2020

4 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. 12

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Questions 109 – 120

Witnesses

Professor Noel McCarthy, Professor of Epidemiology at University of Warwick, and Honorary Consultant Epidemiologist at Public Health England; **Professor Christophe Fraser**, Senior Group Leader in Pathogen Dynamics at Nuffield Department of Medicine, University of Oxford; **Professor Allyson Pollock**, Clinical Professor of Public Health at Newcastle University, and co-Director of the Newcastle University Centre of Excellence in Regulatory Science at Newcastle University.

USE OF THE TRANSCRIPT

This is an uncorrected transcript of evidence taken in public and webcast on www.parliamentlive.tv.

Examination of witnesses

Professor Noel McCarthy, Professor Christophe Fraser and Professor Allyson Pollock.

Q109 **The Chair:** I thank all three witnesses—Professor Fraser, Professor McCarthy, Professor Pollock—for coming to help at this evidence session. I warn noble Lords that there may be a vote. If there is, I am sure they will deal with it in the usual way. Lady Manningham-Buller will ask the first question.

Q110 **Baroness Manningham-Buller:** This question is about contact tracing. I will start with the public health side of this and ask our witnesses whether they can illustrate good examples, either from history or from what they have observed elsewhere in the world, where people have got it working well. Do we have any good exemplars?

Professor Noel McCarthy: Absolutely. There is a huge amount of effective contact tracing in the UK, routinely. Obviously, for sexually transmitted infections we have a whole team of contact tracers in each clinic. On things that are more akin to Covid, when we have outbreaks of meningococcal infections or measles infection, for example, we actively contact trace with local teams that do that and have broad experience. That has been effective.

What perhaps characterises that is that we have a very clear purpose on what we are doing, which varies: sometimes it is giving an intervention to protect the individual who is traced; sometimes it is taking an action in terms of their not passing it on, as with Covid. For Covid, we do not have something specific and useful for the individual whom we follow, but we have a range of purposes that we might have with contact tracing. We could, as we are mostly talking about, just do forward contact tracing, where we try to find the person so they are less likely to pass it on—if we can find them early enough. We could also use contact tracing to better understand which risk settings are causing the cases to arise. We can trace backwards with contact tracing as well as forwards, so we can find asymptomatic cases that have caused other routes of transmission.

That is the approach they took in New Zealand, where they used contact tracing to try to map out in detail where infection was happening in their community, as well as the more specific goal of stopping spread from the contact they had found.

Baroness Manningham-Buller: Supplementary to that, is the way we are doing and plan to do contact tracing here like that in New Zealand, or is it only half of what the New Zealanders do?

Professor Noel McCarthy: It is different in lots of ways. First, it is different in that there are a lot more cases here than there were there. By definition, it will not be at a bespoke and detailed level at the moment. If we were doing it for far fewer cases, we might be in that position. Our purposes are more restricted at the moment; they are

mainly about stopping forward ongoing transmission from any case we find and from their immediate contacts

Baroness Manningham-Buller: To do that, what is it most important to know?

Professor Noel McCarthy: For forward contact tracing, the most important thing is to find the contacts, find them at speed, and then obviously to have people in contact with them who can make an effective intervention, so that they are likely to change their behaviours in a way that will stop them spreading infection. That is for the forward contact tracing. If we were to add extra goals to our contact tracing, we would also have to get quite different information.

Baroness Manningham-Buller: What is the timing? By what stage with Covid is it vital for the contact tracing to be done?

Professor Allyson Pollock: Speed is absolutely of the essence. There is pretty much a consensus that you really want to find the contacts within two to three days, maximum, of identifying the cases. So speed in identifying the cases and testing them is of the essence, and then going on to trace all the contacts. That is essential.

Professor Christophe Fraser: I am happy to elaborate on that. There is good precedent for contact tracing for coronaviruses. A lot of contact tracing was done, particularly in Asia and south-east Asia, with the SARS epidemic, and the Middle Eastern MERS epidemic was also characterised by a lot of contact tracing.

The purpose is twofold: to reduce the risk of onward transmission and to understand and identify outbreaks very quickly. One of the things that Covid has in common with other related coronaviruses is the capacity to cause quite slow chains of transmission and occasional large outbreaks. It is important to be able to understand and identify those large outbreaks quickly.

In terms of the timing, there are now more than 20 publications showing that the serial interval, the time between the index case getting symptoms and the people they infect getting symptoms, has a mean of five to six days. However, you start being infectious—this is a unique thing about Covid and why this situation is a bit more difficult compared to our other recent experiences of contact tracing—about two to three days before symptoms.

So there is an incredibly compressed period of time of about three to four days when you want to find the contacts, and, typically, index cases do not come forward and identify themselves within the first couple of days of experiencing symptoms. You would typically be looking at trying to complete the testing and contact tracing process within about two days. You can still achieve things if it takes longer than that, but you are losing about one-third of your effects for every two days that you go onwards from that. That gives you an idea.

Q111 **Baroness Manningham-Buller:** Obviously, the success of contact tracing depends partly on public trust in it. Do any of our witnesses have

any observations on that aspect of this public health necessity?

Professor Allyson Pollock: Trust is absolutely essential. The patient has to have trust in the system, in the test results and in the support they are going to receive. Going into self-isolation or quarantine means considerable hardship, so it may not be possible, depending on people's living and social conditions.

It is therefore essential that the contact tracers are very skilled and experienced and able to ascertain the conditions that people are in, and understand their anxieties, their fears, and the stigma, but contact tracers must also be in a position to ensure that those people receive the support they need. That support may be financial, to do with housing, or information—there will be a whole range of aspects.

One cannot underestimate the importance of trust in this whole system. I think we are beginning to see signs in the track and trace data that there are issues of trust; call handlers are finding it hard to reach contacts and hard to get cases to release names of contacts. We really need to understand much more about the position of cases and contacts, and we will need some rapid, qualitative, behavioural research to really understand that.

We should also draw on the experience of sexually transmitted infections and the sexual health services. Many of their contact tracers have special qualifications as advisers and counsellors. Sorry, am I going on too long?

The Chair: No, but we need to move on, otherwise we will run out of time. We might come back to what you just said later on.

Q112 **Lord Mair:** Is it possible to say what proportion of contacts need to be identified for a test and trace strategy to be effective at reducing transmission? What proportion ideally needs to be identified for this?

Professor Noel McCarthy: Professor Fraser probably has a lot more detail on that. At one level, the more we contact the better, but there is also the matter of which contacts we trace. Just to emphasise what Professor Fraser said about outbreaks being important, in New Zealand, where there are sufficiently small amounts of disease that we can see the wood for the trees, fully one-third of its cases were in just 16 outbreaks or clusters. Finding the people involved in those clusters and outbreaks early and acting on them effectively is incredibly important, whereas some other chains of transmission might not go anywhere. An outbreak at a homeless shelter would be particularly difficult to link back and find, but it would be a really important contact.

That is one part. The other is that it depends critically on how the disease is spreading apart from the contact tracing. If we go back to where we were in early March, when it was spreading at a very great rate, we would need to have pretty well perfect contact tracing to have any chance of keeping it down. However, if there are other measures in place that mean that the general rate of spread from each case on average causes only one and a half additional cases, then even moderate-quality contact tracing could have quite an important effect.

Those are the broad bits, but I sense that Professor Fraser is much more qualified than I am to talk about the specific maths of percentages and how that would flow through.

Professor Christophe Fraser: I agree with Professor McCarthy's broad characterisation. The maths essentially says that there is a trade-off. We have multiple ways to control the infection. To some extent, the test and trace system is there because we do not want to live indefinitely with social distancing, working from home and the economic costs.

Essentially, the number of contacts traced per individual in the UK is currently rather low, but that is because we are in that social distancing framework. We need to design the test and trace system if the aim is to ease the lockdown. I am quite keen on comparisons. Countries that have controlled the infection with much less of a lockdown and less emphasis on social distancing typically trace around 30 contacts per index case, which is much higher than the numbers given in the UK, which are currently more like six people per index case.

If we look at the number of index cases that we have every day, that is a lot of people being contact traced. We need to be in a situation where we can do more of that as we ease the lockdown. It is a matter of trading off the different types of interventions and having a system of surveillance that allows us to see very quickly whether the interventions are not working so that we can be reactive.

Professor Allyson Pollock: One of the big issues is that there is a legal notification system for reporting notifiable diseases. It has not been followed, it has been bypassed, which has meant that we have had a real lack of data on suspected and actual cases. That is partly because of the testing pillar 2 results not coming in. Notification really starts with the suspected cases, because that is what should be reported to local public health departments, but they have not been receiving the data to act on that, nor are they required to receive the data on the tests, so they do not know about the positive cases which are test positive.¹ We have the example of Leicester, where local public health does not have detailed local data on cases and their postcodes to monitor the outbreaks.

The real issue is not so much the percentage of contacts that you are reaching but the number of cases that you are contacting and reaching to identify the number of contacts and, of those, how many contacts you are actually reaching. The Government is focusing a lot on the contacts and the percentage reached. The returns are pretty low at the moment as only around 50% of cases over the last month gave details of contacts. We really need to relate contacts back to the actual number of cases providing details of contacts. Those data are poor.

Lord Mair: Following on from that, could I ask about compliance? What is the likely level of compliance with self-isolation advice?

Professor Allyson Pollock: I would ideally use the term "adherence". Lots of factors affecting adherence involve finance and housing—people's

¹ The operator of the labs have a legal obligation to notify PHE of positive tests.

situations. That is why we need to understand more about the position of cases and contacts, and a bit of quick qualitative research to inform that.

The Chair: Do you have any idea what the adherence rate is just now? That is the question that Lord Mair is asking.

Professor Allyson Pollock: There are no data available on how many people are going into self-isolation and quarantine, or the outcomes—whether the contacts are actually converting to cases and being tested. We have no data at all.

Lord Mair: One final point on the same subject: what strategies might be needed to increase levels of adherence?

Professor Allyson Pollock: It is about support. We have very much emphasised in the independent SAGE group the need for support for self-isolation and quarantine. This is a very difficult position. We also need to understand what local communities need in the way of support, which is why we really need to do much more to understand that, drawing on other evidence from elsewhere.

The Chair: Some of the other questions will explore that, so we will probably come back to it.

Q113 **Lord Hollick:** The data for 4 to 10 June suggests that contacts were not identified for a quarter of the people who tested positive. How does that compare with the experience in other countries, such as New Zealand and Germany? Why is that the case? What do you suggest could be done to improve the proportion of people sharing their contacts?

Professor Christophe Fraser: I have seen the same data that you have and I have no particular additional insights. I think it has been reported that about a quarter of index cases reported zero contacts. That is possible; we are still experiencing social distancing. The distribution of contacts that people report is very skewed; some people report many contacts and some very few.

I emphasise the point made by Professor Pollock that there are losses throughout the cascade. The biggest loss seems to be right at the beginning, which is that the number of people expected to be newly infected every day, according to the ONS data or the ZOE app estimates, is quite consistent. It seems that only about a quarter of people are testing positive at the pillar 2 level. We do not have the data on how quickly that is happening or is broken down regionally.

There are also losses further on relating to being able to contact the index cases themselves and then being able to contact the contacts. If you put all those percentages together, you end up with a rather low estimate of the total number of contacts of infected individuals.

Lord Hollick: Thank you. Professor McCarthy, why is this experience apparently worse than in other countries? What should be done to try to improve the response rate?

Professor Noel McCarthy: Of those experiences, if you are talking about the response rate of people reporting their contacts, the main point

to make here is, as Professor Fraser just said, that we actually have a very low number of initial diagnoses. If we are not diagnosing three-quarters of the cases, a perfect tracing system for the other quarter has limited function.

Assuming that we improve our initial diagnoses and increase those across the board, obviously we will still have to improve our follow-up. Twenty-five per cent identifying no contacts is too many, even just for household contacts. Only about one in eight people are living on their own, so we should at least be able to get those household contacts. The people who pick up an infectious disease are generally the more gregarious ones, because they will have had to have been with someone simply to pick it up.

You ask them, "Have you had any contacts over the past several days?" but we are definitely missing a lot of them. Why are the numbers so low? I know a bit about what I should do as a contact from being interested in the subject. But if my information was from my consumption of the media and public messages, I think I could be very poorly educated about the purpose of contact tracing, what my role in it is and what its broader effects are. There are huge gaps in clarity and understanding of what is going on. We do not have a societal level of understanding.

Coming back what to Professor Pollock said about specific communities, in parts of the Midlands, where I work, there are complex households with many members. If we start trying to find their contacts it will cause financial havoc to the family and household, which may be an issue. How do we ask people to quarantine when there are three generations in the household?

Q114 Baroness Hilton of Eggardon: There are obvious difficulties in getting people to self-isolate. At the moment, the contacts are required to self-isolate only once a case has been confirmed. Would it be possible, practicable or useful to get them to do so once the initial case has symptoms and is suspected? Professor Pollock probably has views on that.

Professor Allyson Pollock: It would be useful to ask people as soon as they are suspected cases, but the problem is that they are not coming forward through the system as suspected cases are not being notified as they should. If they were, we would ask them to self-isolate and to warn other members of the household. That would be the preferred route, but that means that you would then have to have a very rapid testing turnaround time, of anything from six to 24 hours, so that you do not place an unnecessary burden on the household and the individual.

Professor Noel McCarthy: There are many people out there with symptoms. If symptoms are almost certainly typical of Covid, that might be one track, but our first step should be to get people who have actually been diagnosed and confirmed coming through. As we come into winter, when there may be quite a wide range of flu-like illnesses, that could multiply things to such a scale that I am not sure it would be feasible.

Professor Christophe Fraser: We have done some specific simulations on that question. We found that notifying people of being a contact of a suspect who has symptoms can make a large difference to the epidemiological impact of the intervention. It can more or less double the effect on reducing the reproduction number. However, we do not have very specific definitions of symptoms. The best specificity you could get with asking about a wide range of symptoms is about 50%, which would result in many people being notified that they are contacts of suspect cases but turning out not to be contacts of Covid cases.

The behavioural scientists and the policy discussions recognise that complexity, but there might be phases when we are trying to get control of a second wave. Our simulations, and those of colleagues, show that doing that could make a big difference, but it would be a matter of communicating very clearly what being a contact of a suspect case means, so that you do not undermine confidence in the system.

Q115 **Lord Browne of Ladyton:** I do not think I am expected to ask you to apply these questions to the actuality of what is happening in test and trace in the United Kingdom, as you perceive it. They are more general than that, although you may want to apply them.

What proportion of transmission is thought to be through known contacts, as opposed to unknown ones? I think by "unknown" I mean unknown to the person who has been asked. To have an effective system, is it enough to contact only the known contacts of an infected person, assuming that they are encouraged and trusting enough to be asked about them?

Professor Noel McCarthy: As Christophe mentioned, we are getting an average of only eight, and, as said earlier, 25% name nobody. So we are clearly missing a lot of the contacts. Perhaps the big question is: are the contacts who we are finding the most important ones, and the ones we are missing less important?

People may remember those with whom they had intense, longer contact better than minor, trivial contacts. We do not really know who they are remembering and who they are missing. There is a possibility that the known contacts are more important, but we do not know that. This is an area where things like apps might help, so we would have a parallel record of how many people were close to somebody. At the moment, we know that there is a big gap, but we are not sure how numerous or important those contacts are.

Lord Browne of Ladyton: Professor Pollock, you indicated that you wished to say something?

Professor Allyson Pollock: Professor Fraser probably has something to say on this, but household contacts are probably the most important, followed by others. If you go for the household contacts, you will be helping a great deal.

Professor Christophe Fraser: We are a little bit lacking in data. There have been a number of publications on secondary attack rates in different

populations. Our best guess is that roughly one-third of infections are within the household, one-third in known contacts and one-third in miscellaneous. However, that is very variable, and during a lockdown it is much more concentrated on household contacts.

It is also worth noting that superspreading is more likely to occur among the miscellaneous contacts. For most people, most of the people they infect might be in their household or are very close contacts. Getting the false positive/false negative part of any contact tracing system is difficult. A pattern that has been reproduced again and again around the world involves an occasional person, or an occasional event involving a large number of people, in a miscellaneous setting. The contact tracing system needs to be responsive to both types of transmission.

Lord Browne of Ladyton: In addition to the app, which has already been referred to, are there methods for identifying contacts who the infected person does not know by name and cannot direct you to? If so, which of these methods is effective?

Professor Christophe Fraser: I do not know the answer to which methods are effective. However, one method being used in several countries, including Germany, when reopening public places such as restaurants and pubs is asking people to sign in and sign out so that they can be contacted. I would not want to comment on how effective that is proving.

Professor Noel McCarthy: We are telling you "We do not know" a lot. This is a plane that is being built at the same time as it is having to fly. It is important that we set up a system to answer these questions within the contact tracing system that is gathering the data. It is impossible to know it now, but it is possible to build studies and evaluations into the contact tracing. If we are not overwhelmed by just doing it, that would gradually improve the information about which routes are effective and which not.

Lord Browne of Ladyton: We are in the business of learning lessons for the future. From your experience thus far, what are the pretty obvious lessons for the future in this regard?

Professor Noel McCarthy: We want to learn messages for the immediate future. We want a very iterative system of contact tracing that continuously adapts to what we learn. One thing that has come out of the idea of outbreaks and superspreading events is whether we are increasingly able to say that we can find these. Are there ways in which we can see whether all new cases were part of a known contact chain, and, if not, can we trace back and try to understand how we missed them? There are sets of studies that we can set up now for the immediate future in that iterative sense.

Q116 **Lord Borwick:** How successful has the UK's contact tracing strategy been so far? You have been quite clear that it has not been terribly successful so far, but is that due to the actions taken under that strategy, or is the strategy itself flawed?

Professor Noel McCarthy: If we are giving it the purpose and goal of substantially decreasing the rate of onward spread, it has not been successful so far. The large majority of cases are not being diagnosed in order to enter the system. When they do enter it, we are finding perhaps only a small proportion of contacts, and there is a considerable delay in finding them. Therefore, we are probably preventing very few onward infections, if any, at the moment, but we are finding some clusters and outbreaks, and are intervening in those.

At the set-up stage, the system was almost guaranteed not to succeed in its purpose, and at this stage our judgment of success is really just based on whether we are improving our mechanisms. There are real difficulties in bringing in this system while there is such a high level of infection while releasing other control measures. It is unclear whether it is good enough to operate at the scale that it needs to, as opposed to being good enough to operate at a smaller scale. So in the short term it will be hard for the system to be a success.

Lord Borwick: Are you optimistic that it will get better later?

Professor Noel McCarthy: I am not sure. Doing it well involves quite intense bespoke follow-up for each case. Then, as Professor Pollock keeps saying, when we get to each person and ask them to isolate, that is quite a complicated educative interaction. Trying to do that while there are several thousand cases a day will require a skilled workforce on quite a huge scale. Therefore, improvement to me seems far from guaranteed. If other measures keep the spread moderately low and this system is used on top of those measures, we might get there at a more reasonable pace.

Professor Allyson Pollock: I agree. This is a very complex intervention and it needs very sophisticated people operating it to make it seamless. Germany has now reinvested in its 400 public health departments and has trained contact tracers. It has norms for the number of cases per hundred thousand that it can deal with before triggering lock down, plus surge capacity.

The UK Government have taken a different tack. One of the oft-repeated complaints from the directors of public health is that they are not getting the local data, the notifications of suspected cases, or the test results. Instead of building that up through Public Health England and with the public health departments, the Government have added a bolt-on, which is the new centralised, privatised system of call handlers. So it is incredibly complex. Contact tracing now deals with complex cases through public health teams and with the non-complex cases through the centralised call system.

However, it is even more complicated than that, because there are three levels of call handlers: levels 1, 2 and 3. Serco and Sitel have employed 25,000 Levels 2 and 3 call handlers with very little training to do the contact tracing. Level 2 call handlers are being employed at a managerial level. Level 3 call handlers were recruited as sales advisers, not as contact tracers, and they had less than one day of training. Level 1 call handlers were recruited through Capita and employed by NHS Professionals, and they are working out of the public health teams.

However, we have no idea how the different parts and the contracts awarded within this system are really working or whether they are working together, because the data are not telling us much.

The only data we have is that the public health outbreak teams are doing six to seven times more work to trace the contacts than the call handlers recruited through Serco and Sitel. That is all we know, but we do not have a very good breakdown of the data.

Therefore, at the moment we have a system that is highly fragmented, very inefficient and probably poor value for money, bearing in mind that we have been told that there are 25,000 call handlers at the level 3 grade but they have had less than 15,000 calls in a three-week period: that is, 25,000 call handlers dealing with 15,000 to 20,000 calls ie less than one call a week.

So there is a real issue about the value for money, the efficiency and the effectiveness of the system. Why has the UK gone down this route instead of doing what Germany did, which was to follow its contract tracing system and to put in, and build up, good local public health capacity? That is what the directors of public health all across the country are calling for at the moment.

Lord Borwick: I have a question for Professor Pollock. You said earlier that one problem is that, after people have been told to isolate, we do not know the extent to which they are actually isolating. Presumably, that will get even worse when there is generally less and less isolation. As the country gets less locked down, people will believe that they are being picked on and will ignore what they are told. Is that correct?

Professor Allyson Pollock: There may well be an increased feeling of stigma and a deeper level of anxiety. That is why it is really important to bring health professionals and general practitioners back into the equation. We need to have good community monitoring and community health monitoring of cases and contacts. The GPs have been bypassed—

The Chair: Are there any other parts of the United Kingdom where that is happening?

Professor Allyson Pollock: Yes. I am talking mainly about England, but it is true that there has been a problem in Scotland as well. There are reports that GPs in Scotland and England have not received test results until very recently. Even the results of pillar 2 tests—the ones carried out in commercial laboratories and the Lighthouse Labs—are not going back to GPs at all, and many of them are not being linked back to the NHS numbers.

Therefore, we have a real problem with the testing part as well as with the contact tracing, and with the uncoupling of the testing and contact tracing from the medical practitioners. It is vital that we bring the health professionals in, because they are the people whom patients trust and listen to.

Q117 **Baroness Blackwood of North Oxford:** Professor McCarthy, you mentioned the challenge of scaling contact tracing. Early on in the

process, the contact tracing app was seen as one way to scale the process, but since then Baroness Harding has called this the “cherry on the cake”.

How important do you think developing the app will be to controlling the pandemic, and what is your assessment of the Government’s decision to delay the launch of the app? Do you think that manual contact tracing can be effective on its own?

Professor Noel McCarthy: The short answer as to whether an app is useful and whether it will work and be of help is that I do not know. I am absolutely certain that, as you said, it is the cherry on the cake and that it is important as part of an overall strategy rather than it ever being a major part of the solution. There is a huge range of apps that we could be using. Most of the talk is around proximity apps—ones that ask whether I have been close to somebody else and for how much time. However, we have very little idea how that maps on to risk. Lots of simulations have predicted how it might map on to risk, but we really do not know.

As society changes—either opening up or closing down—the number of people who will be within the circle of a particular amount of distance for a particular amount of time will change radically. As the disease moves to a higher or lower level, the risk that that will mean for transmission will change radically.

There is a huge amount of uncertainty about what I should do if my app tells me that I was within 1.6 metres of somebody for six minutes. The distances they can measure are very limited, so if we tried an app we would have to see what it showed. That may help us with target tracing, but at the moment we do not really know.

There are also apps, as Christophe mentioned, where people sign in and out of restaurants and pubs, but by scanning a QR code. So you get those settings-based apps. That might be easier and give some useful information earlier to help us pick up outbreaks or superspreading events.

However, the apps are really part of control, and still leave us with all the difficulties of diagnosing the cases at the front end and effectively doing quarantine at the back end, which are really hard. All they do in between is give some, uncertain, addition to measuring who has a meaningful contact.

Q118 Baroness Blackwood of North Oxford: Professor Pollock, you were comparing UK performance on contact tracing with the German performance. Of course, the Germans have introduced their contact-tracing app—with, I think, 15 million downloads, although I may be wrong on that number. I wonder what your assessment is of the role that the app is playing in their contact-tracing regime.

Professor Allyson Pollock: As I understand it, the app was released only in the past week or two or 10 days, so it has not been a central part of contact tracing, which has been mainly the old-fashioned shoe-leather

epidemiology. Germany focused on building up its 400 departments of public health, and even in Germany the app was quite controversial because it moved from being a centralised to a decentralised app.

I do not know enough about what information is being collected, but I do know that in Switzerland, where an app is being developed in conjunction with Germany and Austria, the idea is that it is Bluetooth, so it will trace contacts within 2 metres for more than 15 minutes, but it will delete the information on the contacts within 14 days.

That is what I have been told by my Swiss colleagues. Again, it is important to understand the purpose of app and to define that in order to understand that. My understanding is that the app is at best to support. When they were surveyed, many of the public health doctors in Germany were not convinced that the app was going to be altogether useful. It remains to be seen what it does and how it functions. But you are absolutely right that there seems to be a lot of trust now in that people are downloading the app in Germany.

Baroness Blackwood of North Oxford: Professor Fraser, you mentioned some of the other technologies that have proved useful in other nations. So far, I think, the UK beta app has been tested during a period when movements have been restricted, so contacts were reduced. Do you think the use of these technologies will become more important as people return to daily activities and are more likely to come into contact with people they do not know?

Professor Christophe Fraser: I think contact-tracing apps have potential, like all new technologies. The idea has been tested in the past in the context of flu and Ebola in research studies, but this is the first time it has been tested.

We are really in uncharted waters with contact-tracing apps in the situation we face. The experience internationally is that it takes a while to develop, refine and improve the process, which is perhaps unsurprising. The technical performance of the UK national pilot in the Isle of Wight has been commented on, and the uptake of the app, which was introduced as part of combined manual contact tracing and app-based contact tracing, resulted in rapid decline in confirmed pillar 1 and pillar 2 cases. There is more than one way to control the epidemic. There was a lot of social buy-in to the lockdown, but it is not a sustainable measure.

The other thing I have learned throughout this epidemic is that things change very quickly. The politics change very quickly. Right now we are in a situation where the bulk of transmission is in complex cases, care homes and institutions, but we should also be building the infrastructure that will help us to manage a potential second wave where we start to see transmission going back into the wider communities. In some communities, the possibility of recording contacts between people in open workplaces or more social environments may be a more popular or sustainable way of controlling the infection compared to the alternatives.

Whichever way we go, we need to be very responsive to the data, to find good ways of continually assessing how different interventions used in

different are working, and to continue to compare our experiences with those of other countries. It is never easy. It is good to compare with countries where that has worked well, but one of the things we see in countries that have managed to control the epidemic very successfully is that they did lots of things and improved each of the components of the things that worked, including contact-tracing apps. It is notable that the countries that have been quite forward in trying contact-tracing apps early were also doing lots of other things, so they are working well.

So it is too early to tell, but there is lots of potential for contact-tracing apps to help to prevent certain types of transmission.

Professor Allyson Pollock: Also, we must not forget inequalities and accessibility for older people, ethnic groups, people who do not have language, and the poor. We have to consider all these factors when we are thinking about uptake of apps.

Q119 **Lord Hollick:** You have spent much of the past 10 minutes telling us about problems with testing and tracing and the isolating part, which curiously seems to have dropped off of the narrative. The public, some of whom have enthusiastically grasped the opportunity to stop isolating, were told that testing, tracing and isolating would be the safety net, that it would catch the people who fell through when we stopped socially isolating. What assurance can you now give the public that there is a satisfactory safety net?

Professor Noel McCarthy: I do not think we can say that at the moment there is a satisfactory safety net through testing and tracing to make a significant impact to control the epidemic. We know that a large number of people are cases that are never diagnosed with the virus, and all the points that we have been through.

We know there are gaps at various stages of the system, but coming back to how Professor Fraser described it: every country that has done this has started it and then kept changing it, trying it and changing it. There is scope for it to improve substantially over time and to make an impact, but it will need radical transformation, and many of the points are about whether this is really embedded in local services and is functioning with them.

There is an example I gave earlier: if we have a homeless person and we are running this test-and-trace system, which is largely a national, telephone and internet-based system, how quickly do we get down to that person's local contacts and engage with local services to find them and their contacts and put interventions in place?

We will need much more embedding of stuff in local services and much more engagement in the complex communities we have for it to work, as well as the overall system scaling up, and getting faster.

Lord Hollick: Professor Fraser, to what extent does manual testing and tracing make up the shortfall that we are seeing on the app and the existing tracing system?

Professor Christophe Fraser: At this point in time it is difficult to evaluate. An ideal system would say both. The main conclusion from our work and from others—there is a real consensus among epidemiologists—is that the primary feature of contact tracing for controlling Covid is that it is actually quite difficult compared with other coronaviruses and other large outbreaks that we have dealt with in the past. It is to do with the shortened time and having to go very fast.

So the stated aim of the manual contact tracing programme—to be able to deliver contact tracing at scale and very rapidly—seems to be the right one. Some statistics have been published on the speed of manual contact tracing, but only for the non-complex cases. There are no statistics on the three-quarters of complex cases. What has been lacking for a very long time is any statistics on the speed of turnover of pillar 2 community testing and how that is varying by site.

As part of this process, which is an unprecedented situation, you have a new system that you want to be able to learn from and iteratively improve, while publishing the statistics that allow us to answer these questions and being able to hold the system to account and then improve it. We all understand that you have to start somewhere, but those are lacking. Many of the answers have been that we do not really know. That highlights a lack of data and statistics.

Lord Hollick: Professor Pollock, what would you recommend the Government to do to build public confidence in the safety net that they believed would be in place through a successful tracking and tracing system?

Professor Allyson Pollock: It is regrettable that contact tracing stopped on 12 March and that there has been this four-month delay in getting it going. We do not have much time, because we have the autumn coming, when we will have lots of other respiratory tract infections and influenza.

I recommend central co-ordination and resourcing of locally integrated and delivered contact tracing services. That means working with public health and with Public Health England alongside primary care, which will also need resourcing to do the monitoring of cases and contacts, and NHS laboratories, which have also been left out. There needs to be a serious look at how you build up the local capacity to have an integrated, seamless service, because this is such a complex intervention. We cannot afford to have the continuing fragmentation, ad hoc systems and services that have been put in place; it is all highly fragmented. That is what I would recommend.

We also need urgent legislation, because there are no clear chains of accountability. There are so many organisations involved: NHS England, NHS Improvement, Public Health England, the commissioning bodies, NHSX and so on and so forth. It is really important that we have strong legislation that enables local contact tracing, with clear accountability and control from the centre for co-ordination and resourcing.

Q120 **Lord Kakkar:** We have heard about the importance of asymptomatic individuals in the epidemiology of this disease. Is there a rationale for

trying to develop a system of broad-based regular and repeated population testing to identify symptomatic and asymptomatic individuals who carry the virus? Would that be feasible in our country?

Professor Allyson Pollock: The ONS infection surveys try to look at those who have infection. Unfortunately, they are very small numbers and we do not know how symptoms are being validated. They are coming up with quite high percentages of people who are asymptomatic on the day. It would probably be useful to refine, improve and increase those surveys so that we have a greater understanding.

The other big problem with these surveys is that symptoms are not being validated against clinical notes or by health professionals. It is very difficult to know whether they truly are asymptomatic or develop symptoms later.

Lord Kakkar: But might a strategy of repeated, regular testing on the population so that you identify those carrying the virus, whether they are symptomatic or asymptomatic, be a feasible approach, with better point of contact testing technology developing?

Professor Noel McCarthy: I think that is a different question than we have answered—testing as a direct intervention, rather than just a sample of the population. If it were possible to have monthly testing of the whole population even moderately accurately at minimal cost, that would give huge intelligence to guide and then isolate people based on positive tests.

It is just the scale involved: doing 50 million tests every three weeks is such a scale that it feels unthinkable. It absolutely might be the case in subpopulations: if we get recurrent outbreaks in particular settings, we could go into that setting and say that we will continuously test. Obviously, that is happening to an extent in care homes at the moment, which might or might not be a useful thing, but one might also imagine meat factories, universities and other settings where that might happen.

There is obviously also the development of environmental testing. We know that the detectable virus goes up in large sewage works in big cities slightly before you see new cases. If we could scale that out to various levels, we might have a measure where we can look at sewage in an area and then go into subpopulations after being triggered. However, the scaling is again potentially huge.

Professor Allyson Pollock: Also, you are getting into screening territory. We have to be very careful, because all tests give false positives and false negatives and can cause harms. If you are going to advocate this, there would be a case for drawing on the screening principles and thinking about it very carefully within an ethical framework. As well as the harms, there is the potential for waste because of the cost. It would have to be thought about very carefully indeed, drawing on those principles from the National Screening Committee in Public Health England.

The Chair: We have only a couple of minutes. For the track and trace system—you mentioned that we need to collect data—what would the

matrix look like to assess its success?

Professor Allyson Pollock: You ensure the notification system is working, you are identifying suspected cases, you know the number of suspected cases being tested and the number that have been test positive, and you are then capturing most of your contacts and managing to ensure that people are isolating and quarantining with the support they need. These would be performance measures that you would put in.

Professor Christophe Fraser: I agree with those internal metrics of success. Also very clearly important is maintaining a low level of infection rate—keeping the reproduction number below one, including being able to do so sustainably when other parts of the world are not. It does not seem to me to be too ambitious to aspire to join the club of countries where the epidemic has become just a series of localised outbreaks rather than a sustained epidemic, and to be able to control big outbreaks by understanding dynamics in terms of localised failures of the system and to have a system that responds to that and continuously learns and improves as a result.

Professor Noel McCarthy: The true outcome, as Professor Fraser said, is the rate being at a low level while the rest of life can go on. Is the testing and tracing doing that? Perhaps the single simplest measure will be what proportion of new cases were people we knew were contacts through the test and trace system, because if it is working we will have known that they were coming through with their infections. That can be a very good internal metric. The external metric is clearly a sustained decrease in cases.

The Chair: We finish bang on time. Thank you very much, Professor Pollock, Professor Fraser, Professor McCarthy, for helping with this session. It has been most informative and will help us very much with our future sessions. Thank you for joining us today. We appreciate it very much.