HOUSE OF COMMONS

# Science, Innovation and Technology Committee

## Oral evidence: Emerging diseases and learnings from covid-19, HC 506

Wednesday 24 January 2024

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Watch the meeting

Members present: Greg Clark (Chair); Dawn Butler; Tracey Crouch; Dr James Davies; Katherine Fletcher; Rebecca Long Bailey; Stephen Metcalfe; Carol Monaghan; Graham Stringer.

Questions 271 - 303

### Witnesses

Professor Sir Andrew Pollard, Director, Oxford; and Dr Clive Dix, C4X Discovery.

# Examination of witnesses

Witnesses: Professor Sir Andrew Pollard and Dr Dix.

Q271 **Chair:** We are very pleased and privileged to welcome back two other heroes of the response to the pandemic. Professor Andrew Pollard is director of the Oxford Vaccine Group in the department of paediatrics at the University of Oxford, and, as everyone knows, was chief investigator for the clinical trials of the Oxford-AstraZeneca covid-19 vaccine that led to a vaccine that has been used in more than 180 countries with over 3 billion doses distributed.

I am very pleased to welcome Dr Clive Dix, who was appointed deputy chair of the UK's Vaccine Taskforce in June 2020, working with Kate Bingham, and then led it from December 2020. Dr Dix is now the CEO of C4X Discovery.

Thank you very much indeed, both of you, for your service and your continued service in drawing on that to help us to advise the Government and the authorities on preparedness for future pandemics.

Perhaps I may start with a question to Professor Pollard. In terms of the vaccine sector in the UK—we have been discussing, as you have heard, future pandemics and future diseases—how is the state of our ability on vaccines to respond to a future unknown virus?

***Professor Sir Andrew Pollard:*** In many ways, we are not in a very different position. The question is anticipating what the next pandemic looks like. Of course, the danger is that we look back at the pandemic we have just had and only think about preparing for another one that is exactly the same. It is important to remember that with the disease we were dealing with, a coronavirus, we already knew a lot about coronaviruses; we knew how to make vaccines for them. There had been decades of research on coronavirus vaccines, so it is a relatively trivial scientific exercise—not trivial to actually do—to say you need a particular gene from the virus, which you can get quickly from sequencing, and then you can make a vaccine.

One of the problems is that we have not done any of that work for most of those other microbes that are out there and that could threaten us. If it were to take 10 or 20 years to do the research and development, we are nowhere near even the beginning of that starting gun.

That is one of the areas I see the most concern about, and it is not just a UK concern, it is a global one. Are we doing enough to look at the different families of viruses and bacteria that we already know are a threat but we do not have enough understanding about, as well as different exemplars within those families, to be sure that if you take one and make a vaccine that works, would it also within a family of viruses be the same if it was a different one from that family? That work needs years of investment to try to move it forwards.

If you think about the defence against something unknown, which is clearly an important way to think about pandemics—we do not know when they are going to happen, but we are pretty sure they will happen again; it might be in a year or it might be in 50 years—and then you think about other types of defence that we have such as military defence, where the world feels very unsafe today, and the Government's figures are of £45 billion of investment a year in defence, we recognise that we need to do stuff for peacetime even though, hopefully, we do not have to deploy that.

For pandemics, we are putting a tiny fraction of that into preparedness. We are really unsafe at this moment for future pandemic threats because we just do not have that knowledge base that you need even to start the gun, as we did in 2020, and even then it took 11 months to have a vaccine.

Q272 **Graham Stringer:** Professor Pollard, can you frighten us a bit more by being more specific about which particular families of viruses you would consider to be potentially the next threat?

***Professor Sir Andrew Pollard:*** It is a good question. One of the reasons for not being specific is that there are many families of viruses. The Government list has about 10 of them. The Coalition for Epidemic Preparedness Innovations has a short list, but it also has a long list of 100. To be specific about them is also problematic. We can look at the ones that cause outbreaks around the world in small locations at the moment. If those viruses mutated so that they could spread better, they would be ones that you might focus on first.

One of the biggest problems is that the next pandemic might be one that we have not thought about, and that creates some issues. Perhaps we will talk about what technologies you might have available for that situation.

It is a long list of possibilities that could cause threats. What we can do today is work on those many different virus families and start thinking about how you would have a vaccine that at least is brought to the stage, which was not far enough for coronavirus vaccines, that means you can start the gun.

**Graham Stringer:** Thank you.

Q273 **Chair:** That is a very clear call to think about defence against pandemics in the way we think about defence against physical threats by hostile states and others, and we are grateful for that.

In April last year, Professor Pollard, you wrote an article expressing concerns about the state of clinical research in the UK. Following that, there was the publication of the O'Shaughnessy review. Perhaps you could advise the Committee on whether you think that that review, if its recommendations are implemented, assuages the concerns that you had about the state of research.

***Professor Sir Andrew Pollard:*** The building blocks are there for the capacity for clinical research. Let us talk specifically about pandemic vaccines. If you have a vaccine and you then focus all of your efforts on using the capacity and capability that there is in the UK system for development, we absolutely have that, and, of course, we saw that in 2020. Most of the major hospitals around the country have research nurses and doctors who work this research. We were able to put together a large number of those for the trials of the Oxford vaccine in the pandemic. People came out of the woodwork to work on the vaccine to do that.

The reason we have that capability is there is investment in research in the NHS and there are people doing stuff in peacetime so that they have all the skills to focus on what we need, whether it is drugs or treatments or vaccines when a pandemic comes. In that sense, a lot of that clinical network infrastructure is in place. I am a bit more optimistic about that. We obviously need to keep investing in it and keep the wheels turning. Rather like the discussion we are having about Lighthouse labs, having stuff go on in peacetime is critical to make sure that you are able to do that.

Q274 **Chair:** Part of your concern in that article was about the slowness of some of the administrative processes around clinical trials. It took about 300 days, I think, for your vaccine, if I can call it that, to be able to be deployed. Obviously, there is great uncertainty as to whether one discovers a vaccine for a future virus. In this case, do you think we could count on getting to that point much quicker than 300 days now? Do you have an assessment of how it would be given what we know now?

***Professor Sir Andrew Pollard:*** There are ways in which we could do that. If we looked at the 2020 example specifically—and we probably should not just look at that one—the one way to have gone quicker in 2020 was to run bigger trials. To run bigger trials, you need, first, the Government to commit more money so that you can take more people into the trial. We had about £30 million to run the clinical trials. The US Government gave each developer $1 billion to do their development. There is a big difference in that. We had a relatively small pot of money to deal with.

Secondly, you have to have the manufacturing capability. We could not have made enough doses to run a bigger trial. If you had a trial of 100,000 instead of 25,000, you would get there much quicker because it is about case counting; the cases accumulate during the trial. Trial size and manufacturing capability are critical.

The bureaucratic processes in the pandemic such as the ethical approval worked very well. They were stood up to be very responsive. The regulators put all their staff on sorting out regulation for the pandemic, so they were able to move extremely quickly. They are still very rigorous and ask lots of questions, as they should, but that meant we were able to move very quickly. The ability to scale rapidly on the clinical trials and

the manufacturing needs money and the manufacturing capability, which there still is not today in the UK.

Q275 **Chair:** My colleague Rebecca Long Bailey is going to have some more questions on clinical trials, but perhaps that is a good opportunity for me to ask an initial couple of questions to Dr Dix. You were involved in the Vaccine Taskforce from the outset. It is rightly regarded as one of the major successes of our response to the pandemic. Do you think that the Government and the UKHSA have captured and embodied that success in its current operations?

***Dr Dix:*** The answer to that question has to be a categorical "no". The reason the taskforce was formed is there was no infrastructure to work across industry, academia and Government to pull together what we did. The team of people—the steering group, basically—was a group of very experienced academics, industrial people and people with good strategic vision and ability to make things happen.

What I have seen since April 2021 is a complete demise of all the activities that made that thing work—literally gone. It is very sad. I get very passionate about it. We have seen a whole list of incompetent decisions being made. Given the amount of effort we put in, to see that just disappear is sad.

The Government think that mRNA vaccines are the golden bullet, and there is a complacency there that really scares me now.

Q276 **Chair:** It is extraordinary, is it not, that the Government correctly trumpeted the success of the vaccines—

***Dr Dix:*** Yes, and then destroyed almost everything that was going on. There was a set of very strong recommendations that Kate Bingham and I co-authored. They did not see the light of day. There were activities already going on that were then just stopped. All I see now is, "Well, we have a nice deal with Moderna for 10 years." That is just not good enough. That is really scary. The mRNA vaccines are not the be-all and end-all. They will only work, as Andy has just said, if we know what the virus is and we know the antigen. Without that, they have to start from scratch. They probably have to make every antigen in the virus and see whether they do anything in humans. That is years and years of work.

We do not have any resilience. In fact, we have less resilience now because a lot of the manufacturers have walked away from the UK because of how badly they were treated in the tail end of the Vaccine Taskforce.

Q277 **Chair:** Do you have a view or an insight as to why the Government and the official agencies reacted in that way? They dismantled something that had been a palpable success.

***Dr Dix:*** Yes, I do. There was no strategic visionary leadership. I am not saying I am the great strategic leader, but the taskforce had it in it. The

group knew what they were doing, they knew where they were going and they had put together a plan for resilience. They had put together a whole load of work that said, "If we do this, this and this, we will be in better shape once the pandemic is over." All of that has stopped.

The best example—and it is so current because if we did not know what the virus was we had something that was at least a backstop—is this. I used to call it the crown high ball in a game of bowls; you put one up there just in case everything else that you are going to do is riskier and does not work.

We had Valneva. It produced live inactivated viral vaccines. If you know the virus, you can quickly start making that. It is probably not going to be done in 100 days. It might just if you are really good. We helped it build extra capacity so it could make 200 million doses. It produced a vaccine and it was in the process of doing the final clinical trial, which the MHRA had said if it was at least equal to AZ it would get approved.

During that process, before it had the data, the Government cancelled the contract with Valneva. It tried to recoup its costs. It had to close the site. It nearly put that company on its knees. It lost the European contract because it was just about to sign it when the Government cancelled the contract. We had our Secretary of State stand up and say, because he had presumably been told by somebody—and we need to understand this—that the vaccine would not get approved before the trial was complete. This is incompetence at the highest level.

Q278 **Chair:** Let me ask about the report. You and Kate Bingham jointly wrote a report with recommendations to the Government and to the authorities as to how the success of the Vaccine Taskforce should be continued. One of the recommendations, I understand, was that there should be a national vaccines agency, an executive agency within the business Department to co-ordinate the industrial and the public sector assets. Has that happened?

***Dr Dix:*** No. Actually, I do not know whether it should be in the business Department and it should necessarily be an agency. If we look at infectious diseases generally, we need strategic leadership that can sit on the top stage with CEPI, that can work with the WHO, that can work with the other countries and know what they are doing to understand what has happened with pandemic preparedness, and that can continually be monitoring what is going on in the world, and then set up some activities internally that we need right now, which is making sure that a clinical trial network will work and making sure the MHRA is ready for anything that is coming up. There are a whole load of activities that are real activities that need to be done routinely in peacetime that that agency or that group should do, and it should be led by someone whom, when that name is mentioned, the whole world knows.

Q279 **Chair:** Because they have standing in the life sciences industry.

***Dr Dix:*** In the community. They can sit with a head of a vaccine company or the head of an academic group or with the head of Government and say, "This is what we're doing." We need it. If we do not have that commitment and that focus, all these discussions about pandemic preparedness, these little things going on that I am sure somebody in HSA can pull together and make it look like, "This is lovely. Look at all these things. Look at the Vaccine Development and Evaluation Centre"—

Q280 **Chair:** I was going to ask you about that. The UKHSA has set up a Vaccine Development and Evaluation Centre. Tell us about that.

***Dr Dix:*** That is a testing centre at Porton Down that we have put money into to make sure it has enough capacity to take serum samples from clinical trials and test them in live neutralisation assays. It had the actual wherewithal. It had a category 3 facility to do that. Those people are very good analytical people and testers of something they are given to do. They have nobody who is a strategic leader. They have nobody who understands what the vaccine industry is doing. That cannot be seen as the centre for what we are doing.

Q281 **Chair:** It would be wrong for the Government or the UKHSA to say that centre was discharging your recommendation—

***Dr Dix:*** Absolutely.

**Chair:** We have a lot of questions for both of you. I have been hogging the time, so I am going to go to Rebecca Long Bailey next.

Q282 **Rebecca Long Bailey:** You have already mentioned, Dr Dix, the struggles of one particular company. More widely, we have seen a decline in industry-supported clinical trials. How has this impacted the life science sector, and what do you think needs to be done to entice the resurgence of industry-supported clinical trials?

***Dr Dix:*** That is a big question. The life science sector is very complicated. It goes to different countries. There are myriad reasons. We proved during the pandemic that, by getting our act together with the vaccine registry and being able to say we can use the NIHR to do clinical trials, the capacity and the capabilities were there—they needed fostering and they needed more money—but that all fell away. The people have gone elsewhere, basically.

The one shining light that we should really capitalise on is that our MHRA is one of the best regulators in the world. It is literally gold standard. During the pandemic, it said, "We'll work night and day once you give us the data and we'll make sure that we analyse it in exactly the right way, the way we would do it in peacetime, but we'll do it 24/7 and make it happen," and it did it. It really needs to take a lot of pride in that. The rest of what we had has now been folded and gone.

We have treated most of the pharmaceutical companies so badly. Once we got a couple of vaccines working, the rest did not matter, which is wrong. If we had been right with all of those and kept them moving, we would have had multiple platforms now and we could have chosen which ones we wanted to use in the future vaccine policy work.

We now have to stick with RNA, which produces a great response and then it disappears and you have to do it again. It does not produce a good cellular immune response. These are not real vaccines yet. They are emergency vaccines that did us really proud. Do not knock that, but they are not yet developed, mature vaccines for the future. They may become it.

Going back to the military analogy, the military has just suddenly found a brand-new missile. Our whole system is going to be so much better than everything else. It buys it and, before it starts using it in anger, it throws all the rest away. You would not do that, would you? That is what we have done in the vaccine field.

***Professor Sir Andrew Pollard:*** The issue of industrial partners coming to the UK is definitely an ongoing one. It is partly that there has been a lot of interest in running trials in the UK. During the pandemic the vast majority of the clinical development in Europe happened in the UK because of our NHS capability to do that.

One of the problems today when I talk to investigators around the country is that they are being asked by industry to do clinical trials of vaccines, but some of them are diabetes researchers. They have to do other things. We need for our health to have people working across all different areas, which we did not do in the pandemic; we focused on this area. There is definitely a capacity issue in vaccine development with so many possibilities, both academic studies as well as industrial ones, that we just do not have the capacity to do what we are being asked to do. There is an element there.

Certainly, last year, there were also major problems with delays particularly with the MHRA, which are now solved. When I look from September last year onwards, the MHRA is back on its legally binding timelines, and I think it is trying very hard to improve even beyond that. As that starts to filter through the system, researchers will want to come back to the UK more. Before that, after the pandemic, things were very slow because of a backlog and because of turnover of staff.

Q283 **Rebecca Long Bailey:** More widely, what insights has the UK gained from employing human challenge studies in the development of covid-19 vaccines?

***Professor Sir Andrew Pollard:*** That is a very good question. Human challenge studies have an important role in vaccine development. They have become absolutely critical and mainstream. In Oxford, we have about seven or eight different models where we deliberately infect people

with various viruses and bacteria to test whether vaccines work. It has the advantage that you can get an answer with relatively small numbers of individuals quite quickly. Of course, you have to do it with the right constraints around safety; there are some diseases that you will not test in that way.

With covid specifically, the difficulty with a new disease is being sure that you can then administer the virus safely to the volunteers, and that is in terms of containment so that whatever you are doing does not escape into the community, which we know how to do and we have facilities in the UK to do that, and so that you can ensure the safety of the volunteers. Early in the pandemic, that is quite difficult because you do not have all the information and because of the time that it takes to prepare the strains to do the studies. In the pandemic that we have just had, you could do vaccine development in a traditional way just as quickly.

An interesting question, though is, if in the autumn of 2020 we had found that the vaccines did not work, at that moment human challenge studies would have been absolutely essential to test different constructs, as Clive said, and different components of the virus to see whether we could develop vaccines that would work in that model. I am not sure they were important in the pandemic for development, but they could be absolute lifesavers in the future. Just imagine if we had no vaccine and we were still locked down for another year while we were trying to get one. It is almost unthinkable, and maybe challenge studies were the only way forward.

Q284 **Rebecca Long Bailey:** Do you think that there are any revisions required to the current guidelines for such human challenge trials to make them easier to access in the way that you have just set out?

***Professor Sir Andrew Pollard:*** The UK is the most permissive environment. We run more challenge models than anywhere else in Europe. There are very few countries in Europe that do them at all. We have the most here because of the framework that there is. In a way, there could be more regulation. It sounds bizarre to say that when we are delighted to have so little. We could have a branch of the MHRA involved in looking at challenge models. If you are doing a vaccine study using a challenge model, it will look at the vaccine, but it is really the institution's responsibility around the challenge model, not the MHRA, to look at it.

You can have a degree of regulation. Of course, that is problematic because the MHRA would then have to have a legal framework for it that ensures the quality of what is being given to people. If you were going to challenge them with a virus or bacteria that could cause a serious disease, you want to know that what is in the vial that you are giving them is what you say it is, and that is one of the things that regulators are very good at. They are also very good looking at protocols and thinking about the safety issues. As academics, there is always stuff that you might not think of that they can.

For me, some regulation makes sense. Not all my colleagues in academia agree with that, but having a branch of the MHRA that has expertise in this area that is enabling of challenge models would be helpful. At the moment, we have a very easy environment to work in, but I just wonder whether it needs a bit more of a look at it.

Q285 **Rebecca Long Bailey:** Dr Dix, what is your view?

***Dr Dix:*** I agree totally. We should support the setting up of challenge studies. If we think of the whole environment of infectious diseases, some of our infectious diseases centres should all be enabled to be able to do that sort of stuff generally so that it is one of these peacetime things that can be flipped if you need it.

Q286 **Katherine Fletcher:** Gentlemen, thank you so much for your service during the pandemic and your evidence today. It is important and powerful.

I am going to come out with something that I do not necessarily agree with but is important to add. Funds are finite and when we cannot give people a definitive, "We need to prep for this," you can see how people are worried that we will be preparing for the last war, as Professor Chris Molloy said in the last session. Is there a vaccine technology or platform that you have come across, Professor Pollard, that gives us the best chance of covering off that 100, or is there a risk that in shooting for average generic value we basically design the Ford Allegro of Vaccine Taskforces, if you are a car nut? Professor Pollard, and then I will come to you, Dr Dix.

***Professor Sir Andrew Pollard:*** There are two bits of that to answer. I think Clive has already addressed part of it, which is that relying on one platform technology—and by platform, I mean RNA, killed viruses, or viral vectors like the Oxford vaccine or proteins—and having only the capability for one really limits your ability to respond to the unknown.

Q287 **Katherine Fletcher:** What other platforms would you have in the quiver?

***Professor Sir Andrew Pollard:*** You need a range because they all have advantages in different types of settings. The protein-based ones, particularly virus-like particles, are fantastic. They work as well as—

Q288 **Katherine Fletcher:** Attenuated virus, effectively.

***Professor Sir Andrew Pollard:*** These are essentially proteins. They are assembled to look like a virus. All these technologies are important.

Q289 **Katherine Fletcher:** No, I am just trying to get what they could be on the record. I am sorry to push you.

***Professor Sir Andrew Pollard:*** The spectrum is: RNA vaccines—and we have been discussing that Moderna is investing in manufacturing in the UK in Harwell—viral vector vaccines like the Oxford vaccine, protein vaccines, of which there are several different varieties, and the killed viral

vaccines like the Valneva one. They all have their advantages depending on the exact circumstances you find yourself in.

The second bit is once you have the platform you have to be able to respond to the particular agent that is causing the pandemic.

Q290 **Katherine Fletcher:** Put the key appropriately in the lock and key.

***Professor Sir Andrew Pollard:*** Yes, exactly. Even when you have that particular agent, as we did with SARS-Cov-2 in the pandemic, there are globally around 350 vaccines that were in development, but only eight got approved by the World Health Organisation. That is also a reminder that you do not put all your eggs in one basket. Vaccine development is difficult for all sorts of reasons that we could talk about, but having multiple shots on targets is absolutely the right thing to do in a pandemic.

Q291 **Katherine Fletcher:** Dr Dix, if we have this Disease X that is an unknown, how do we best deploy our technology if we cannot prep for every single possibility?

***Dr Dix:*** The strategy to start with has to be that we work with a partner in the vaccine industry—the whole vaccine industry, not pick a company and then say, "We have done it." If you take something like Sanofi, one of the biggest vaccine manufacturers, it has nine platforms that it can work on. If you are already working with it and you know it and you have a relationship with it, as soon as something comes along and the question is asked, "Which technology are you going to use?", you may have access to it. Likewise with the RNA vaccines, you would not take one company because they will have nuances of how they do it. It is about having relationships with all the top players.

The amazing thing is that GSK is a UK-based company and the second biggest vaccine company in the world, but we do not have a strong relationship with it. That is absurd. We could help to influence it. We tried to get it during the VTF early stage to come to the UK and it was quite close. It went to the board level of thinking about putting some manufacturing in vaccines in the UK and working with us, and it never happened. I have no idea why not.

The whole inter-relationship between academia, industry and Government has to be on a footing where there are people who can hold that relationship. They can be the partners of choice.

Q292 **Katherine Fletcher:** That is a very powerful message to the Committee. You are not asking the Committee to designate civil servants to pick the best winner; you are saying you need to lean on industry and academia, and the picking of the winner is done by them with a mission attached to it.

***Dr Dix:*** Yes. The leadership within the Government—you can call them civil servants—needs to be scientifically and commercially trained and

viable and understand and can go out there. You want them to be a world leader in the CEPI discussions and in the WHO discussions. If we are going to be serious about a pandemic, that is what we do. I am sure the person who heads up our defence—I do not mean the Government but the head of the Army—is known on the world stage and they can talk to anybody. We do not have that, and we need it.

Q293 **Katherine Fletcher:** At the risk of leading the witness, do you think the right lessons have been learned by the UKHSA and the UK Government more widely?

***Dr Dix:*** Unfortunately, the lessons were learned by a small group of us who were running the Vaccine Taskforce, and it never really got transported into the current thinking of the Government.

Q294 **Katherine Fletcher:** Is that a lack of scientific training?

***Dr Dix:*** Absolutely. We used to joke that we had to teach some of the civil servants how to say scientific words because they could not.

Q295 **Katherine Fletcher:** Deoxyribonucleic acid.

***Dr Dix:*** It is important. We should be recruiting a very large percentage of civil servants with STEM training because the world is techno now. It is science techno-based. That is where we are going. It is data-driven. There are quite a lot of people who are skilled in those arts and in the thinking that can then help and make things happen, but we are lost.

Q296 **Katherine Fletcher:** I am very aware we are pressed for time. Would you add anything?

***Professor Sir Andrew Pollard:*** I just want to make one comment about industry relations, on which I completely agree with Clive. We also have to reflect on the fact that, apart from Pfizer, which is an exception, none of the big vaccine developers made a vaccine for the pandemic. No one is really asking why. What went wrong with that? As you said, Sanofi has multiple platforms. It has more expertise in this area in Europe than anyone—GSK is right up there as well—but it does not have a vaccine. It had some problems in its development, but there was not the flexibility to then say, "We actually have to do this". It could have done. It could have got that. There is Merck as well in the US, one of the biggest pharmaceutical companies. None of them made a vaccine that saved lives in the pandemic. Why is that? We need to rely on them. We should not be relying on universities. There is only one in the world that made a vaccine. That tells you how difficult it is for academics to do it. Where have we gone wrong?

***Dr Dix:*** I agree. The people who run that group, agency or whatever you want to call it—I do not want to turn it into a big push on an agency—should have the ability to monitor what is going on in the whole of the biotech sector around vaccines as well as universities because there is a lot of fantastic innovative stuff. We managed to link Oxford and AZ

together so that they could power that on through. Pfizer managed to link with BioNTech. That is why we got that vaccine, but it started that relationship beforehand. Having that ability to say, "This one looks like it really could work, and we need to help you partner with big pharma to make it happen," can be done because it was done. It was done with AZ and Oxford.

Q297 **Chair:** Would you say, Sir Andrew, that a strategic approach between the UK Government, researchers, including universities, and companies could deliver against what you described as the failure on the part of many vaccine companies?

***Dr Dix:*** I think it could. It could encourage it and it could show what the UK can do to help when we get the clinical trials working, with the MHRA, and making sure that some of our facilities are available as well as testing.

***Professor Sir Andrew Pollard:*** You have to have the right people in the room. It is Government, academia, industry and regulators that need to be there in the room. Imagine a pandemic like we might have had if the MERS coronavirus had caused a pandemic and killed 30% of people or, going back to history, the plague that killed 50% of people. If we had a pandemic like that, what is the regulation around vaccines? Would you do trials or would you just start rolling it out and see if it works? I would take a vaccine straightaway if half of the people had been killed.

We do not have any rules that are set for how we respond to different sorts of pandemics that we are ready to just run with. Each time, as we did with this, we have to go to the regulators. At the beginning of 2021, when we were designing our trials, they had no advice. What they ended up with was stricter regulation over the endpoints for trials than were used in peacetime, so it was harder to license than for many of the vaccines that are used routinely.

**Chair:** We are running out of time, so I am going to go to Dawn Butler.

Q298 **Dawn Butler:** Yes. I want to hear the response to Stephen's question, so I am going to be very quick. Thank you both for your evidence, by the way. It has been fascinating. I suspect one of the reasons big pharmaceutical companies did not develop vaccines is that they normally prioritise financial gain. That is normally their driving factor. In the pandemic, that was not the driving factor; the driving factor was that we needed to get vaccines done. You have raised the issue of GSK. The Committee needs to find out why we do not have that relationship with a UK company and get the answers to that.

Can you, for the layperson, talk about what processes were needed to develop a vaccine that were removed and made quicker and speedier for the pandemic? If that is a long response, writing to the Committee would be fine.

***Professor Sir Andrew Pollard:*** I can give a short answer to that and give Clive some time to think about his answer. The short answer is that there are two things that we had already sorted in the UK for speeding up that process. We got it sorted in 2009 with the swine flu pandemic. The Government were able to talk to the MHRA and to the ethics committees, which are two of the key bureaucratic processes about safety and quality that we absolutely need, and asked them to be prioritised. For our vaccine, the first approval of the first trial took seven days from the MHRA and it took four days from the ethics committee. They did not do everything in the same way as they normally would; they just put all their people and prioritised it on to that. That was an absolutely critical part.

The second thing is financing. For normal development, you get the money to do the initial studies before you go into humans. Then you get the money to do the manufacturing and do the phase 1 trial. You then wait another year or 18 months to get the money to do the phase 2 trial, and then another year for the phase 3. It was a bit of a slow start, but eventually we were in a situation where we knew that we could move through the phases—or maybe some of that was just hopefulness—because the money was there to be able to run the studies. Money is the most critical thing for having the confidence to move rapidly.

For AstraZeneca, from the manufacturing side, its decision with the Government to manufacture at scale and at financial risk is critical, because normally you do not do that scaled manufacture until you have the results at the end and you know it is going to work. If you wait for that, you have at least another year at the end to get things up to the scale you need. Hopefully that has helped.

***Dr Dix:*** The only other thing to point out is that the Vaccine Taskforce produced a vaccine registry and all these people volunteered, and it shows the willingness of the public to want to help, because they really did. Half a million people said they would take a vaccine in a trial. It never got used in anger in all the trials. For the Novavax trial that was done here, they recruited 6,000 people in six weeks and got the trial moving very quickly. That type of capability needs to be enhanced and it needs to be protected.

Clinical trials generally take ages because you have to find the people, you have to register them, you have to set them up and you have to get them ready. If you are going to do 6,000 people, finding the right people and getting them all set up in the right place is very difficult. It is not a trivial matter. That did actually work.

**Chair:** Thank you very much. The last word goes to Stephen Metcalfe.

Q299 **Stephen Metcalfe:** Thank you. I am very conscious of time. It is around the issue of royalty waivers. The UN draft pandemic accord suggests that royalties should be waived. What is your view on how much that would impact the ability to incentivise people to develop vaccines if we are

going to ever meet that 100 Days Mission?

***Professor Sir Andrew Pollard:*** In some ways, that whole issue is a little bit of a distraction. I think you were suggesting that maybe there was not so much financial incentive, but Pfizer and Moderna made a lot of money in the pandemic, so it is still a potential financial incentive to develop vaccines in a pandemic because a lot of doses will be used.

The problem with that is the global equity issue. There are different ways that you might solve that. The way that we did that with AstraZeneca is having an absolute red line in the sand at the start. AstraZeneca was prepared to step up and say, "We agree with that approach," and that is extraordinary.

The question for the next one is: would CEOs of vaccine companies, having seen the extraordinary profits that were made by the successful companies, say, "Actually, we are happy to go not for profit in the future"? We do not know the answer to that question, but it is an important one.

One other potential solution is IP waivers where the technology can just be made available to everyone. The downside of that is around control and quality. If you are a developer and you have made a product that you are going to sell, whether it is for profit or not, you do not want someone else making a poor-quality version of it, so then you have to commit to supporting and making sure there is quality for all of them. One of the ways you can do that is by retaining the IP but working with partners. Having that commitment to work with partners might be more than the waiver itself. AstraZeneca supported more than 20 different manufacturing sites around the world so that they could be made in Korea, India and Latin America, but that is a heavy lift for a company; it draws loads of resources into supporting that.

Q300 **Stephen Metcalfe:** But it is an issue when it comes to delivering that equality of access across the world.

***Professor Sir Andrew Pollard:*** Yes, but, if you then had someone using the manufacturing information to make a vaccine that then caused harm, that damages the whole portfolio of vaccines. That is the risk for companies.

Q301 **Stephen Metcalfe:** Perfect. Do you need to add anything?

***Dr Dix:*** I do not need to add anything. That was perfect.

**Stephen Metcalfe:** In that case, I am done before midday.

Q302 **Chair:** Thank you very much indeed. I have one final thing for Dr Dix. You made these recommendations of the Vaccine Taskforce to the Government. They have not been published. Is there any reason you are not in a position to publish them?

***Dr Dix:*** I was not a member of Government, and I was told with a big red stamp on it, "These are not to be published," by the then director general of the Vaccine Taskforce, and they were then put on a shelf somewhere, I think. I have a copy that I am not meant to have. I think they are important and they are probably out of date now. They probably need refreshing and working on again. Many of the things in there were exactly what we saw was needed as we were building the capability to do what we did when we did it and realised if only this had been there beforehand how much easier it would have been. They are sort of "from the trenches"-type recommendations.

Q303 **Chair:** We need to leave it there. I thank both of you again for your evidence today. It is important that we learn the lessons from the success of the work of both of you. It is dispiriting to know that there is some way to go to learn the positive lessons, but we are very pleased that you have both been engaged.

***Dr Dix:*** It can all be resurrected. It is all very good behind the scenes.

***Professor Sir Andrew Pollard:*** Science really does have this. We can do it, but we need to get on with it.

**Chair:** That is over to us, as it were, in terms of Parliament.