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Science and Technology Committee

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The Rt Hon Pat McFadden MP
Chancellor of the Duchy of Lancaster
Cabinet Office
(By e-mail)

4 December 2024

Dear Pat

Vaccine resilience for the next pandemic

I am writing to you on behalf of the House of Lords Science and Technology Committee, in your capacity as lead on the UK Biological Security Strategy with oversight of resilience and civil contingencies.[1] In recent weeks, our Committee has taken evidence on the UK's COVID-19 vaccine development and future pandemic preparedness. This letter sets out our findings from this evidence and some conclusions and recommendations for the Government.

What we heard was inspiring, but also troubling. The UK was able to produce a novel vaccine swiftly due to the skill and flexibility of our research and biomedical community, as well as a good deal of fortune in the key facilities and networks that happened to exist. There is no guarantee that we would be able to do this for the next pandemic. Indeed, our witnesses raised troubling concerns about our capacity to manufacture vaccines for future biological threats.

Our headline message is that **the UK must have a resilient, diversified domestic vaccine manufacturing sector, from research through to clinical trials and large-scale manufacturing. This is a critically important sovereign capability for security against the next pandemic. Recent developments raise concerns, and the sector needs renewed focus and government support to ensure that lessons are learned from the COVID-19 pandemic and capacity retained.**

There are four key areas where we wish to make recommendations:

- **To be ready for a future pandemic the UK needs a robust and active vaccine manufacturing and R&D sector. It must be kept active through regular use to ensure that domestic manufacturing facilities, skilled**

[1] Cabinet Office, 'Policy paper – UK Biological Security Strategy (HTML)': https://www.gov.uk/government/publications/uk-biological-security-strategy/uk-biological-security-strategy-html [accessed 15 November 2024]

teams, and established supply chains are ready to scale up in a crisis. This could be achieved by establishing a **"peacetime vaccines taskforce" that regularly procures vaccines from the UK in response to novel outbreaks across the world**, as part of Official Development Assistance. **The Government should appoint a Chief Vaccines Officer for the "peacetime vaccines taskforce" to provide a clear point of coordination and contact for the vaccine sector.**

- The UK Biological Security Strategy is ambitious and contains many good aspirations. But there is a need to **ensure the focus on implementation is refreshed and sustained with a new Government. The Government should provide regular updates on the Strategy's progress, conduct regular pandemic preparedness exercises, and ensure different agencies have the resources they need to meet their outcomes.** There needs to be a clarity of ownership, clear lines of accountability, and a clear point of contact in Government for developers of vaccines, such as a Chief Vaccines Officer.

- There is a need to **ensure that the UK supports a portfolio of different vaccine technologies and approaches**. The strategic Moderna partnership is welcome, but future pandemics are hard to predict and their underlying pathogens may not be addressed by mRNA vaccines. It is therefore only a partial solution, and there are concerns that the Government may end up being over-reliant on one partnership with Moderna and one technology in the messenger RNA platform. There is also a need for more transparency around what the partnership with Moderna does and does not cover.

- The UK has university-based research facilities, collaborations and partnerships which are strategically important for vaccine development and manufacturing. **These should be funded on a longer-term basis** as part of the Government's ten-year funding plans in the Spending Review for key research institutions, rather than relying on intermittent grant funding which requires repeated applications and risks losing capacity. More flexible funding for industry partnerships would enable the UK to respond to opportunities as they arise.

Lord Vallance of Balham kindly gave evidence to the Committee on this subject during his wide-ranging session with us on 15 October[2]. He told us that, for preparedness for the next pandemic "making sure that we have a plan for a successful [vaccines] industry is the best defence".[3] He further noted that: "You need facilities that are being used, so we need to make sure that we have a vibrant vaccine sector in the UK." He said that this would be a "key industrial strategy point that … will be looked at in the life sciences sector of the industrial strategy."[4]

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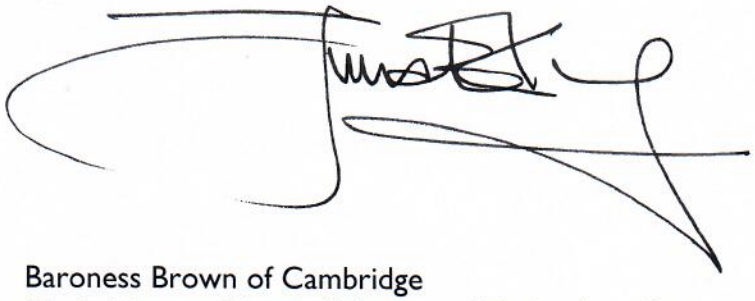
[2] QQ 207-239 (Lord Vallance of Balham)
[3] Q 223 (Lord Vallance of Balham)
[4] Q 222 (Lord Vallance of Balham)

We are encouraged by this statement of intent for support for the vaccines sector as part of the industrial strategy, and we hope that these recommendations will be received in the constructive spirit with which they are made. A relatively modest ongoing strategic investment in maintaining our vaccine R&D and manufacturing sector would pay huge dividends in the next crisis.

The remainder of this letter provides a summary of the evidence and more detailed conclusions and recommendations.

We look forward to your response to the conclusions set out in this letter by 5 February 2025. We are copying this letter to the Rt Hon Chi Onwurah MP, Chair of the House of Commons Science, Innovation and Technology Committee, Rt Hon Peter Kyle MP, Secretary of State for Science, Innovation and Technology, Professor Dame Jenny Harries, the CEO of the UK Health Security Agency, Catherine Little CB, Chief Operating Officer of the Civil Service and Cabinet Office Permanent Secretary, and Lord Vallance of Balham, Minister of State, Department for Science, Innovation and Technology.

With best wishes



Baroness Brown of Cambridge
Chair, House of Lords Science and Technology Committee

Evidence summary and detailed recommendations

On 8 October we heard evidence[5] from Professor Sandy Douglas[6], Dr Adam Ritchie[7], Professor Catherine Green OBE[8] and Dr James Miskin[9], all of whom played prominent roles in the development and roll-out of the Oxford–AstraZeneca COVID vaccine. We pursued the matter further on 15 October with Lord Vallance of Balham, the Minister for Science.[10]

The Committee's interest in the area was prompted by a series of worrying developments in recent years. These include the sale, while still under construction, of the Vaccine Manufacturing and Innovation Centre (VMIC) in Oxfordshire, and its subsequent mothballing,[11] reports that a planned reduction in state aid threatened AstraZeneca's proposed Liverpool vaccine manufacturing facility[12] and a perceived over-reliance on the Government's Moderna Strategic Partnership.[13]

In evidence to the House of Commons Science, Innovation and Technology Committee in January 2024, Dr Clive Dix, former Chair of the Vaccine Taskforce, argued that recommendations he and Dame Kate Bingham had made to the Government had not been acted on. He said that the then Government had "destroyed almost everything that was going on" in favour of reliance on Moderna. He was concerned that the UK had: "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."[14]

Our witnesses raised concerns that "other countries have learned the lessons … from where we are sitting, it appears that government and the public have concluded that the UK can do this and that we do not need to improve our systems", comparing it unfavourably to the more pro-active EU response discussed below.[15] Professor Douglas told us that "the really big players—the US, Japan—are investing orders of magnitude more money in vaccine technology than we are. That is relevant to us. We are competing to recruit the best scientists in a global market, and frankly we are not able to attract the best people from elsewhere to Oxford at the moment. We are largely dependent on home-grown talent."[16]

Dr Adam Ritchie echoed these concerns, telling us that: "the UK, having once been at the front, is now falling behind, because other countries are either building capacity or … a way

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[5] QQ 1-23, (Professor Sandy Douglas, Dr Adam Ritchie, Professor Catherine Green and Dr James Miskin)
[6] Associate Professor, Jenner Institute, Nuffield Department of Clinical Medicine, University of Oxford
[7] Senior Vaccinologist, Jenner Institute, Nuffield Department of Clinical Medicine, University of Oxford
[8] Associate Professor, Wellcome Centre for Human Genetics, University of Oxford
[9] Former Chief Technical Officer, Oxford Biomedica
[10] QQ 207-239, (Lord Vallance)
[11] BioProcess International, 'Catalent mothballing recently bought UK plant':https://www.bioprocessintl.com/facilities-capacity/catalent-mothballing-recently-bought-uk-plant [accessed 15 November 2024]
[12] Financial Times, 'AstraZeneca vaccine project in doubt as UK Treasury seeks to cut state aid': https://www.ft.com/content/633f1f30-b7f0-4257-9bcd-e3951c50e498 [accessed 15 November 2024]
[13] Department of Health and Social Care, 'Press release – UK cements 10-year partnership with Moderna in major boost for vaccines and research': https://www.gov.uk/government/news/uk-cements-10-year-partnership-with-moderna-in-major-boost-for-vaccines-and-research [accessed 15 November 2024]
[14] Oral evidence taken before the House of Commons Science, Innovation and Technology Committee, inquiry on emerging diseases and learnings from covid-19, 24 January 2024, QQ 275–76 (Dr Clive Dix)
[15] Q 5 (Professor Sandy Douglas)
[16] Q 18 (Professor Sandy Douglas)

to pivot existing capacity to deal with an emergency in a way that is supported, funded, and actionable. We are not seeing that from the UK at the moment, and it is a concern."[17] He said that: "if [the] Marburg [virus] gets out of hand tomorrow, we are not in a great position to respond to it."[18]

The UK is potentially well-placed to develop a world-leading vaccine research and manufacturing sector, as demonstrated during the pandemic. This is due to its strengths in bioprocess engineering, early-stage vaccine development from academia, the footprint of large pharma companies, and vaccine-relevant expertise in cell and gene therapies. But there are concerns that it has failed to capitalise on these advantages and the lessons learned from the pandemic while other countries have been increasing their investment.

The UK needs to ensure it retains robust vaccine manufacturing and scale-up capacity for the next pandemic, but it is falling behind other countries. Witnesses argued that the UK was fortunate to be able to produce a vaccine at speed in 2020 and should not assume this will be possible in the future without renewed and sustained support, and that this relative success may have led to some complacency compared to countries that have funded vaccine manufacturing more urgently.

UK domestic vaccine manufacturing capacity

Our witnesses described how the Oxford–AstraZeneca vaccine was developed and set out the key elements in its success. While emphasising that there was a fair degree of luck,[19] they set out the following reasons for success:

- Previous work on vaccine technology that could be adapted to deal with the COVID pandemic;
- The existence of a network through the UK BioIndustry Association to gather potential collaborators;
- The existence of the Oxford Clinical Biomanufacturing Facility, with capacity rapidly to produce batches of vaccine for clinical trials;
- The creation of the Vaccine Taskforce and its portfolio approach to procuring vaccines;
- The expertise within the MHRA and its willingness to act as a responsive regulator;
- The willingness of individuals, institutions and companies to take reputational and financial risks. This was particularly relevant where companies had a duty to shareholders.

However, they were concerned that the UK had fallen behind other countries in its preparedness for a future pandemic. While the EU had introduced its EU FAB scheme to place contracts with four contract manufacturing organisations to provide capability not only for mRNA vaccines, but also viral-vector and protein-based options, in the UK VMIC had

[17] Q 23 (Dr Adam Ritchie)
[18] Q 8 (Dr Adam Ritchie)
[19] Q 1, Q 3 (Professor Sandy Douglas, Dr Adam Ritchie, Professor Catherine Green and Dr James Miskin)

been mothballed and the agreement with Moderna covered only mRNA solutions.[20] Professor Douglas argued that the EU contracts ensured facilities were "ready, warm-lit, stocked, staffed and have the process to produce up to 325 million doses in a year when the EU says so".[21] Dr Ritchie told us that: "There are big programmes to improve manufacturing capacity in almost every other part of the world at the moment, but there is very little here that would allow us to pivot quickly."[22]

In this context, the UK may be unable to access manufacturing capacity swiftly. Dr Ritchie suggested: "In 2020, as a country we were at the front of the queue in many ways. Now I am not sure that we are not right near the back of it."[23] Professor Douglas expanded:

> "Where you are in the queue matters. [In 2020 the UK was] early in our development, so we got first dibs on the finite global supply of all the tedious things like bioreactor bags, filters and so that you need to make very large quantities of vaccine. Now, nowhere in the UK is holding stock of them, to my knowledge. Germany has contract with the supplier already and would get them in an emergency."[24]

There are concerns that some of these key supply chain products that are required to scale-up vaccine manufacturing would be difficult to obtain during a pandemic. Dr Miskin described obtaining this material supply as a "Herculean challenge" and noted that the "Defence Procurement Act" in the US made it illegal for multinationals to sell materials outside the US if there was outstanding demand in the US.[25]

Our witnesses raised concerns around a lack of central control and decision-making such as that exercised by the Vaccines Taskforce during the pandemic.

In some cases, domestic facilities exist which could be used to make vaccines, but the UK may not have a plan to get the most out of them. Professor Douglas said that "facilities that have the capability to make commercial-scale millions of doses, the UK has those facilities as well. The facilities at Oxford Biomedica, which exist normally to produce cell and gene therapies, a completely different type of medicine, can be repurposed to make vaccines." However, "There is no strategy to pull the facilities that exist into the vaccine space and to make sure that teams at places like Oxford Biomedica can respond and repurpose in an emergency if they need to… to get the most out of them for the public benefit."[26]

Dr Miskin, formerly of Oxford Biomedica, which ran this facility, explained that it was more by chance than design that their facility existed: "By sheer chance, unrelated to the Covid pandemic … we just happened to have a facility that was principally designed to manufacture

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[20] Q 5, Q 6 (Professor Sandy Douglas, Dr Adam Ritchie, Professor Catherine Green and Dr James Miskin); POLITICO, 'EU buys vaccine capacity to prepare for next pandemic': https://www.politico.eu/article/eu-buys-vaccine-capacity-to-prepare-for-next-pandemic/ [accessed 15 November 2024];
European Commission, 'Framework contract signed under EU4Health to guarantee a fast response to future health crises': https://hadea.ec.europa.eu/news/framework-contract-signed-under-eu4health-guarantee-fast-response-future-health-crises-2023-06-30_en [accessed 15 November 2024]

[21] Q 5 (Professor Sandy Douglas)

[22] Q 6 (Dr Adam Ritchie)

[23] Q 6 (Dr Adam Ritchie)

[24] Q 6 (Professor Sandy Douglas)

[25] Q 13 (Dr James Miskin)

[26] Q 2 (Professor Sandy Douglas)

viral vectors." This facility "ended up making over a hundred million doses", but Dr Miskin warned there was "an alternative universe where that facility did not exist … there are not that many of them in the UK", and that it was important to think "about how we make sure there is an ongoing mechanism to help that kind of thing to be there when it is needed." Dr Ritchie described this as the "single most lucky bit: that the capacity was available. The odds of something like that being there next time are very low."[27] Dr Miskin described the importance of "encouraging organisations to maintain that warm capacity, capability, competencies" so that it is ready when needed.[28]

Professor Douglas did not think the mothballing of the Vaccine Manufacturing Innovation Centre (VMIC) was necessarily problematic but wondered whether its funding could be used to maintain capacity in vaccine manufacturing facilities, a process that could be overseen by a "peacetime vaccines taskforce" with the ability to invest and agree "contracts for emergency response" using the portfolio approach previously adopted.[29]

Such a taskforce could "keep things warm" by commissioning vaccines to deal with emerging outbreaks such as Marburg, not necessarily in the UK,[30] and would act as a single point of coordination which "pulls in the capability that is used to make other sorts of medicines to serve the UK public for emergency vaccine response."[31] Such commissioning would "become an exercise … in making sure the capacity is there", whether or not the resulting vaccine were needed in the UK.[32]

As Professor Green argued, there could also be soft power advantages in providing vaccines overseas.[33] She explained that her facility had been involved in an early phase of vaccine production for the Marburg virus, but that it was now being manufactured outside the UK.[34] Yet witnesses explained that "a lot of research funding over the years" for vaccines like malaria and Ebola have come through Official Development Assistance.[35]

There is a need to accept at-risk procurement for vaccines: "if you are not responding quickly and find out that you did not need to respond nine times out of ten, you are responding too slowly".[36] Professor Douglas praised the "VC-type approach" of the vaccine taskforce that enabled it to fund responsively in a way that was appropriate to individual projects.[37] The economic advantages of substantially quicker procurement for a vaccine against a pandemic threat are huge, as COVID has demonstrated.[38]

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[27] Q 3 (Dr Adam Ritchie)
[28] Q 3 (Dr James Miskin)
[29] Q 5 (Professor Sandy Douglas)
[30] Q 8 (Professor Catherine Green)
[31] Q 5 (Professor Sandy Douglas)
[32] Q 13 (Dr Adam Ritchie)
[33] Q 13 (Professor Green)
[34] Q 8 (Professor Green)
[35] Q 13 (Professor Douglas)
[36] Q 13 (Dr Ritchie)
[37] Q 23 (Professor Douglas)
[38] Modelling has suggested that if the COVID vaccine had been available in 100 days, it would have averted 15.7 million hospitalisations, 4.8 million deaths, and averted ~$1.5 trillion in economic damage globally. Imperial, 'Imperial modelling shows 100 Days Mission could have saved 8 million lives': https://www.imperial.ac.uk/news/256938/imperial-modelling-shows-100-days-

Professor Douglas said that he had "made a pitch through Innovate UK for not even the whole proceeds of selling the facility but just the amount of money that had been invested pre-pandemic … to be retained for a peacetime vaccine taskforce, reserve capacity and so on. That proposal sank without trace."[39]

Lord Vallance said of the Vaccine Taskforce that "there was something really galvanising about the way we brought people together to have a clear aim. There is a danger that a task force that you set up in peacetime might just drift a bit. It needs focus and for somebody to say "I'm in charge of this"."[40] He also raised the crucial importance of at-risk procurement in supporting innovation, saying that:

> "it is likely that if the Vaccine Taskforce had failed, which was the most likely outcome at the beginning, it would have been slated as a waste of public money and a terrible thing for somebody to have done. That is the thing that drives conservative behaviours of not taking risks on the approach we take to investment and procurement. We have to get that risk appetite right as part of this."[41]

In this context, domestic manufacturing of vaccines for outbreaks that do not become pandemics is still a useful investment as it allows R&D and manufacturing capacity to be retained, which more than pays for itself when a pandemic does occur.

He argued that the UK was in a better position now than it was in 2020, as prior to the pandemic "for decades, the vaccine infrastructure of this country had gradually eroded. We no longer had a major manufacturer of vaccines based in this country, even though we had the No. 1 vaccine manufacturer in the world—GSK—because all its facilities were overseas." He said that there were now "domestic manufacturers of vaccines" citing AstraZeneca, BioNTech, and Moderna, the latter "two new messenger RNA companies", but agreed that "There are facilities and it is important that we look at them and ask whether they are adequate."[42]

Lord Vallance said that one of the key insights from COVID was that "it is not a good idea to have standby facilities … if your facility is not being used the whole time, it is very difficult to get it to work properly during that time. You need facilities that are being used, so we need to make sure that we have a vibrant vaccine sector in the UK." He said that this would be a "key industrial strategy point that … will be looked at in the life sciences sector of the industrial strategy."[43] He concluded "Making sure that we have a plan for a successful [vaccines] industry is the best defence".[44]

To be ready for a future pandemic, the UK must ensure that it has a robust and active vaccine research and development sector and vaccine manufacturing industry. This requires regular activity right through the supply chain from

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mission/#:~:text=Deploying%20effective%20COVID%2D19%20vaccines,three%20months%2C%20new%20analysis%20finds. [accessed 15 November 2024]

[39] Q 5 (Professor Sandy Douglas)

[40] Q 225 (Lord Vallance of Balham)

[41] Q 234 (Lord Vallance of Balham)

[42] Q 222 (Lord Vallance of Balham)

[43] Q 222 (Lord Vallance of Balham)

[44] Q 223 (Lord Vallance of Balham)

initial research and design through to clinical trials, regulatory approval, and scale-up of manufacturing.

Regular government procurement of novel vaccines seems a sensible way of achieving this and keeping the vaccine ecosystem active and operational. This would maintain the facilities, networks of expertise, links between industry and government, and supply chain contracts that would be needed to scale up in a crisis.

This could be done in conjunction with Official Development Assistance to respond to outbreaks of emerging viral threats overseas. This would have the advantage of contributing to the UK's soft power and reducing the likelihood that outbreaks become pandemics while supporting the domestic vaccines sector.

As Lord Vallance concludes, a small amount of procurement risk is critical for supporting broader innovation and will pay for itself many times over if it helps to prevent a crisis—just as was the case for the Vaccines Taskforce. A "peacetime vaccines taskforce" could coordinate this regular, at-risk procurement and provide a clear, single point of contact for Government to interface with the vaccines sector. The taskforce would not need to replicate exactly how the Vaccines Taskforce was structured or operated but could be adapted to suit its peacetime status.

The Government should consider setting up a "peacetime vaccines taskforce" that can commission and procure doses of vaccines to be manufactured when there are novel virus outbreaks around the world. This could be empowered to undertake at-risk procurement of domestically developed vaccines, including design, testing in clinical trials, and scaled manufacturing. It should be led by a single responsible owner—the Chief Vaccines Officer—who has industry experience and provides a single point of contact for the vaccine sector, and is empowered to procure novel vaccines.

This should be done in the knowledge that not all of the vaccines may be used, but that the investment in maintaining a thriving vaccine R&D and manufacturing ecosystem with strong relationships with the Government is a worthwhile one, and that a thriving vaccine sector can contribute to the UK's Official Development Assistance and soft power.

UK Biological Security Strategy

The previous Government's *UK Biological Security Strategy* set out to implement, by 2030, "a UK-wide approach to biosecurity which strengthens deterrence and resilience, projects global leadership, and exploits opportunities for UK prosperity and science and technology (S&T) advantage."[45]

Of particular relevance are the Strategy's Outcome 14 and Strategic Enabler 2:

> "Outcome 14: Capability to scale up discovery and development of therapeutics and vaccines within 100 days underpinned by targeted R&D programmes across the range of biological threats."
>
> "Strategic Enabler 2: UK Science base, health and life science sector: A world-class science base, resilient S&T capabilities against the spectrum of threats, and a thriving Health and Life Sciences sector, increasing trade and stimulating growth and investment across the UK."[46]

Our concern is to ensure that the UK vaccines sector is sufficiently robust to deliver the Strategy's ambition in this area.

This is an area that often requires Government intervention: as Professor Douglas explained, "vaccines are not hugely profitable; there are lots of market failures there."[47] Yet the relationship between Government and business can be difficult to manage. Dr Miskin told us that vaccines are "a notoriously challenging area for for-profit organisations, simply because a lot of vaccine projects are negotiated with Governments rather than commercial organisations, and Governments can and sometimes do change their mind quite quickly, which is not helpful for a commercial organisation."[48] This echoes Dr Dix's comments to the Commons Committee and reflects stories like the Government's cancelled vaccine deal with Valneva, as well as Oxford Biomedica's own experiences as described by Dr Miskin.[49] Yet at the same time, "democratic Governments are not terribly good at investing for the long-term in things that might never happen."[50]

Dr Miskin warned against complacency in the UK from the success of obtaining a vaccine during COVID: "I have heard words to the effect that the industry stepped up and showed that we do not have a market failure in the UK for this problem, so we do not need to invest in government support for such capabilities. That is too big a jump to make …" The Government still needs to play a key coordinating role for the vaccine sector: "another

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[45] HM Government, UK Biological Security Strategy, Cm 858 (June 2023), p 8: https://assets.publishing.service.gov.uk/media/64c0ded51e10bf000e17ceba/UK_Biological_Security_Strategy.pdf

[46] HM Government, *UK Biological Security Strategy*, Cm 858 (June 2023), p 21: https://assets.publishing.service.gov.uk/media/64c0ded51e10bf000e17ceba/UK_Biological_Security_Strategy.pdf

[47] Q 2 (Professor Sandy Douglas)

[48] Q 4 (Dr James Miskin)

[49] Q 15 (Dr James Miskin); The Guardian, 'UK Cancels Covid vaccine deal with French firm Valneva': https://www.theguardian.com/world/2021/sep/13/uk-cancels-covid-vaccine-deal-french-firm-valneva [accessed 15 November 2024];

[50] Q 11 (Professor Sandy Douglas)

organisation, like a peacetime vaccine taskforce, that has the duty to co-ordinate and create that joined-up thinking is missing. I think that closing that concept off was a mistake."[51]

On the UK's current efforts, there was a mixed picture. Dr Miskin told us that he "knew of the [UK Biological Security] strategy, but … not very much about it." He said that after asking the opinion of others in the industry that "conceptually, it is a great idea" but that they were unaware of how much progress had been made: "There are some high-level concepts and strategic aspects to the plan. How much of that has turned into action, budget and progress I cannot say, I am afraid."[52] Their perception was that the Biosecurity Leadership Council was focused on things like DNA sequence security, but that pandemic preparedness was a broader issue and he had "seen no tangible action that is helping to build the UK's capability around that yet." Dr Adam Ritchie concurred: "no one has reached out to us or our peers on what we should do with vaccines under this strategy".[53]

They suggested that the idea of pandemic preparedness exercises would be helpful, but that they "have not heard anything about" these exercises. Professor Douglas told us he was "not aware of any joined-up plan from government, either … to prepare and make sure we had the capability to respond within 100 days … or to know what will happen on day one. What is the process that we would follow in that emergency."[54]

One lesson learned from the team's experience during COVID was the importance of clear lines of responsibility in an emergency situation. Professor Douglas explained that when they were developing the Oxford–AZ vaccine: "There was no established relationship with anybody who might make a rapid decision to invest some money in making a vaccine quickly. Who even has that responsibility in government?"[55] This was still an issue, and Professor Douglas argued that there needs to be "some serious thought" about how "to make really clear who is accountable". This could be "a specialist non-Minister responsible" for the 100-day response, such as a "chief biosecurity officer". He also suggested more accountability with "something that is at arm's length from government and is a reporting mechanism" such as "an annual report on the state of the UK's preparedness."[56]

On how the Government could support pandemic preparedness, Lord Vallance said that "UKHSA needs to understand how it would respond to any outbreak", and also that it was important that the UK "stays completely in the middle of" the global 100 Days Mission for vaccines and therapeutics.[57] On who was responsible overall for pandemic preparedness, Lord Vallance said that "this was exactly the challenge we found in 2020, which was that it was benign neglect … there was not somebody who thought it was their job", but that under the Biological Security Strategy, "for overall pandemic preparedness, it sits in the Cabinet Office".[58] Appearing alongside the Minister, Alexandra Jones, Director General for

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[51] Q 6 (Dr James Miskin)
[52] Q 8 (Dr James Miskin)
[53] Q 8 (Dr Adam Ritchie)
[54] Q 8 (Professor Sandy Douglas)
[55] Q 3 (Professor Sandy Douglas)
[56] Q 11 (Professor Sandy Douglas)
[57] Q 225 (Lord Vallance of Balham)
[58] Q 223 (Lord Vallance of Balham)

Science, Innovation and Growth at DSIT, told us about the importance of doing "dry runs and scenario planning" under the supervision of organisations like SAGE.[59]

Lord Vallance discussed UKHSA's response to the recent Mpox outbreak and suggested that it was relatively easy to develop a vaccine for Mpox due to new platform technologies, and that PCR diagnostics were better than in 2020, but that "in therapeutics, we were lagging", which he attributed to "a technological gap". Viral vector and mRNA vaccines allowed you to "instantly" develop an initial candidate for a vaccine, but drug discovery does not have this general purpose platform and "there is still quite a long way to go to get that right."[60]

The Committee was pleased to note the recent announcement of the strategic partnership with Oxford Nanopore to create an 'early warning system' for pandemics as concrete actions towards fulfilling the goals of the Biological Security Strategy (Outcome 9 and 10).[61] Similar initiatives in other areas of the strategy would be welcome.

The Committee welcomes the UK's 2023 Biological Security Strategy, which is an ambitious strategy for safeguarding against the next pandemic. However, the strategy requires continued focus on implementation, and this risks falling behind other Government priorities. Our witnesses in the vaccine development and manufacturing industry were not aware of tangible actions resulting from the strategy, or who was taking overall responsibility for its delivery. Some aspects of the strategy, such as the importance of regular "fire drills" for pandemic preparedness, require a regular timetable of actions to maintain readiness.

The Government should recommit to the Biological Security Strategy. It should provide regular updates on progress towards the outcomes in the Biological Security Strategy—in particular, how the vaccine and therapeutic outcomes are performing. It must provide the relevant agencies with sufficient resources to achieve their goals, and there must be clear lines of responsibility within Government as to who is responsible for delivering on each outcome. This should also be apparent to the key industry and academic institutions the Government needs to partner with to make the Strategy a success. These connections can be maintained and enhanced by conducting regular "fire drills" for pandemic preparedness.

Moderna partnership and supporting a range of vaccine technologies

Our witnesses were unclear on what precisely the strategic partnership with Moderna covered: for instance, whether Moderna was required to take part in contingency planning exercises or manufacture vaccines for non-respiratory viruses.[62]

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[59] Q 225 (Alexandra Jones)
[60] Q 225 (Lord Vallance of Balham)
[61] Department of Health and Social Care, 'Press release – UK to create world-first 'early warning system' for pandemics': https://www.gov.uk/government/news/uk-to-create-world-first-early-warning-system-for-pandemics [accessed 15 November 2024]
[62] Q 8 (Professor Sandy Douglas)

Dr Ritchie told us he was "worried" that the Government might view the partnership as a substitute for a wider vaccine preparedness effort. Professor Douglas told us that:

> "I do not know, and I have not been able to establish, whether the contract with Moderna extends beyond batches of basically a Covid vaccine and a flu vaccine—respiratory viruses. Think of the scenario where, for example, there is some obscure Ebola-like virus on the other side of the world and it is not yet clear whether it is an emergency. If there is somebody in the UK Government to decide that we should make a vaccine against it—I do not know whether there is—does that contract require Moderna to make a batch quickly when the UK Government say so? I have no idea. There may be a problem with what is in the contract. There is certainly a problem with transparency about what is in the contract."[63]

There was also concern that reliance on mRNA might leave the UK vulnerable in scenarios such as a multi-resistant bacterial outbreak; Professor Douglas explained "there are some really important things that mRNA cannot do".[64] Professor Douglas told us that the portfolio approach of the Vaccine Taskforce was critical: "the UK did not have all its eggs in one vaccine basket."[65] He also described the EU's scheme for vaccine procurement, which "secures capacity to make three different types of vaccine", including mRNA, viral vectors, and protein vaccines, such that "between those, I would be quite confident that if a vaccine could be made … they would be able to make it." If it is not possible to "buy into" this system, "we need to replicate something quite like it."[66]

As well as this, there were "weaknesses in the current technology" portfolio available; the US and Japan were researching "mucosally delivered vaccines, such as intranasal or oral vaccines". The advantage here is that they might be easier to distribute, but might also induce "stronger immunity" in "mild infection", which might "actually stop a virus being transmitted by mildly infected people". It is unclear whether the Moderna partnership approach would cover research into new vaccine technologies.[67]

On the importance of a range of different technologies, Lord Vallance agreed, saying that "you need a range of technologies … you absolutely cannot look at it and say that messenger RNA is the answer to all vaccine problems. I do not believe it is." He highlighted alternative routes, including viral vector vaccines, and described the Oxford Vaccine Group which focuses on these as "outstanding".[68]

The Moderna partnership is welcome, but future pandemics are hard to predict and their underlying pathogens may not be amenable to mRNA vaccines. The UK must pursue expertise and capacity in a portfolio of vaccine technologies. *Any peacetime vaccines taskforce should have in its remit a goal to support a portfolio of different vaccine technologies. The Committee would welcome clarity*

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[63] Q 6 (Professor Sandy Douglas)
[64] Q 10 (Professor Sandy Douglas)
[65] Q 1 (Professor Sandy Douglas)
[66] Q 12 (Professor Sandy Douglas)
[67] Q 18 (Professor Douglas)
[68] Q 224 (Lord Vallance of Balham)

around which aspects of pandemic and vaccine preparedness are covered by the Moderna partnership.

Long-term funding for key facilities, collaborations, and organisations

Our witnesses were also concerned about a lack of secure ongoing funding for facilities such as the Oxford Clinical Biomanufacturing Facility (CBF).[69] This facility was described as extremely important. Professor Douglas told us that:

> "Oxford … had a technical and an organisational capacity … built up over more than a decade to address other problems—difficult vaccines against malaria and TB … that proved to be repurposeable, including, very importantly, the facility that [Professor Green] runs, which, very unusually for a university, gives us the capability, autonomously in-house, to make a batch of vaccine that can go into people. I do not think that many other universities in Europe, if any, have access to that."[70]

He further elaborated that "The first step in taking something from the lab into humans … is making a first clinical grade" batch, which needs a facility like the Oxford CBF. He told us that "those small-scale facilities, which are the first step on the road, are not hugely expensive" with an annual turnover of "£2.5m a year", in exchange for which "a substantial proportion" of vaccines that had gone into phase 1 clinical trials were produced.[71]

Yet Professor Green told us that this facility had "no strategic funding. All my projects are funded on a project-by-project basis". The continued operation of the facility relied on other Oxford academics applying for grants to produce vaccines there.[72] Professor Douglas described the situation with "no core funding" as "precarious", with "points in the last decade where one individual leaving post could have led to the facility falling over."[73] Even during the pandemic, "there was enormous risk stemming from a lack of timely funding"; the team had to determine "whether we could afford to take the risk of kicking out the project that was then in [the CBF] … and whether we could backfill if we lost that funding. We were putting at risk about £50,000 per week where we switched projects … but for want of really very small amounts of money, meaningful time could have been or was lost."[74]

Professor Green explained that ensuring it was possible to produce a vaccine required sustained support of the entire pipeline, from "creative, innovative academic manufacturing and idea generation … in our universities" and "small biotech", as well as "effective phase one clinical trials—all happening in peacetime, because that is the foundation" for scaling up in an emergency. Finally, "then we need kept-warm manufacturing capability for sufficient doses for the population."[75]

Dr Miskin, who was on the leadership team of the Medicines Manufacturing Industry Partnership, explained that government funding problems can hamper the partnership with industry: "one of our frustrations … was that cycle of funding and not knowing when the

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[69] Q 11 (Professor Sandy Douglas, Dr Adam Ritchie, Professor Catherine Green and Dr James Miskin)
[70] Q 1 (Professor Douglas)
[71] Q 2 (Professor Sandy Douglas)
[72] Q 1 (Professor Catherine Green)
[73] Q 2 (Professor Sandy Douglas)
[74] Q 3 (Professor Sandy Douglas)
[75] Q 11 (Professor Catherine Green)

funding would be allocated … things often take a lot longer than we feel they should, and the window of funding is bizarrely, frequently narrowly crammed into a particular tax year." He explained that "for industry, you need pots of money that are relevant for competency building that do not crop up once every six years without any warning, but are there every six months". Part of the problem was in inflexible procedures for allocating grants: "you have to be able to say to a Treasury forensic accountant, "You wouldn't do this project unless you had that 10% or 15% of additional support from the UK Government", which as a company is very hard to say categorically." More flexible funding that would "encourage growth of organisations to build capabilities" would be helpful.[76]

Another key organisation during the pandemic was the MHRA. Professor Douglas said that "A core part of the reason why the UK could be innovative in this space was because we had a highly capable responsive regulator. Not only was it able to turn around applications and review things in real time as we sent them in, but it had the experience and the expertise to look at new ways of doing things and to say, "Okay, that's not how it's been done before, but we can see that that would be safe, so go ahead."[77]

As well as long-term funding for key institutions and research projects, witnesses argued that "there needs to be an emergency pot, a rainy-day fund" such that "when the trigger gets pulled" there is the ability to deploy grants quickly.[78] Professor Douglas said that one way of overcoming "the long-termism problem" was considering "an endowment" or similar novel structure for funding critically important research in the UK.

Witnesses expressed support for some proposed Government policies. Professor Douglas told us that the willingness to "fund Innovate UK on a 10-year cycle rather than from spending review to spending review" was "really important." When asked about long-term funding for individual research labs that had to rely on grants, Lord Vallance referred to the Government's initiative to consider longer-term (10-year) funding for certain R&D institutions and said that this should "definitely be looked at".[79]

The Committee welcomes the Government's plans to provide 10-year R&D budgets to certain key institutions and research projects. If implemented appropriately (as a floor and not a ceiling), this can provide a continuity of scientific expertise and capacity which cannot be guaranteed with fickle regular grant funding.

The Government should consider using its 10-year R&D budgets to support institutes, regulators, and research groups that are critical for pandemic readiness, including researchers who develop and design vaccines and therapeutics and enable stage 1 clinical trial manufacturing, so that there is no risk we will lose out on vaccine expertise due to short-term grant funding.

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[76] Q 22 (Dr James Miskin)
[77] Q 1 (Professor Sandy Douglas)
[78] Q 13 (Professor Sandy Douglas)
[79] Q 223 (Lord Vallance of Balham)