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CHANGE

How the Government Should Call the Shots: Getting the UK Vaccine- Ready

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Key Recommendations

There are key decisions that the government must take to deliver safe and effective vaccines in the shortest time frame possible, allowing the UK to live safely and freely alongside Covid-19. These cover the development, distribution and administering of the vaccine itself, as well as other complementary measures including the continued rollout of mass testing and the delivery of a health passport that gives individuals ownership of their Covid-19 status. In this paper, we set out a four-pillar approach to vaccine rollout, but we would draw attention to the following key decisions that need to be taken:

Development, Distribution and Administering of the Vaccine

- Following the approval of Pfizer's vaccine candidate, continue to build an ecosystem of safe vaccines that are shown to be effective enough in ongoing rolling review, using the powers conferred under Regulation 174 to authorise use of unlicensed (note, not untested) vaccines if necessary.
- Identify, prepare and accredit all possible large-scale vaccination sites now. These should include Nightingale hospitals, large public venues and local community sites.
- Rapidly develop cold-storage and cold-transport infrastructure for vaccines now, including industrial freezers, mobile freezers for smaller settings and mobile cold-storage trucks.
- Recruit, remotely train and set aside testing capacity for a volunteer workforce – drawing on the NHS volunteer pool and retired NHS staff – to prepare them to administer the vaccine alongside health professionals.

Testing and Therapeutics

- Continue the approval and rollout of rapid antigen tests nationwide, ensuring there is sufficient personnel outside of the armed forces to administer tests.
- Ensure there is consistent and uniform data capture from Covid-19 testing in all settings that can feed into a health passport.
- Provide therapeutics to anyone belonging to a high-risk group who tests positive for Covid-19, especially in the early stages of infection.

Health Passports

- Urgently approve a digital platform for a health passport that can draw on vaccine and testing data to enable individuals to live freely and safely alongside Covid-19. This platform should also have a paper-based version.
- Introduce a national framework and data standards to ensure any test taken, vaccine received or therapeutic administered can be recorded and fed into a health passport, including in GP surgeries.

- Commit to rolling out a national health passport by Q2 2021 that keeps the economy and society open, reopens travel and avoids future lockdowns.

Overview

Recent announcements regarding the progress on Covid-19 vaccines are a cause for celebration. The brainpower of scientists and the bravery of trial participants has led to the approval of Pfizer's vaccine and development of other serious candidates in an unprecedentedly short time frame, and we have taken a significant step towards the light at the end of the tunnel we recently set out. We have seen results in phase III clinical trials of 90 to 95 per cent efficacy. This is truly remarkable.

We owe it to these scientists and trial participants, as well as to the key workers who kept our country running when a vaccine seemed a million miles away, to get the rollout of vaccines right. This means making sure there is a strategy in place and ensuring that the machinery of government exists to deliver that strategy. All of this should be supported by a communications campaign that provides clarity in its simplicity.

Vaccines – like every measure implemented – should protect the NHS and those most at risk from Covid-19, allowing us to live safely and freely alongside the virus.

To achieve this objective, a vaccine strategy should:

1. Secure our hospitals, care homes and frontline workers.
2. Protect those most at risk from a severe Covid-19 infection.
3. Enable individual ownership of an individual's Covid-19 status and allow them to participate socially and economically.

With these three strategic goals in mind, we propose a plan delivered across four pillars.

- Pillar 1 – **Plan** for vaccination rollout
- Pillar 2 – **Prepare** the infrastructure for the distribution and administering of vaccines
- Pillar 3 – **Protect** the NHS and **prioritise** those most at risk for Covid-19
- Pillar 4 – Provide a health **passport** to enable individuals to live safely and freely

Each of these pillars must be given resource, energy and political leadership. Our recommendation is that a Minister for Vaccinations, reporting directly to the prime minister, is appointed immediately and that they have oversight and accountability for each area. We recommended a Minister for Testing in April, but this has not been adopted. The resultant organisational, logistical and political chaos cannot be repeated when it comes to vaccines. Work across all pillars must start now.

A distribution plan must address several difficult tactical questions: Who gets vaccines first, and where and when will they get them? How should and could we coordinate vaccinations alongside mass testing? How do we address the time between doses for multi-shot vaccinations?

Across each pillar there is significant overlap with testing, the role of which is only going to become more important. The UK's testing infrastructure should continue to be built. Testing data must interact with vaccine data, providing invaluable, ongoing insight into the efficiency and role of each vaccine candidate. Ultimately, our vaccination strategy would lead to a health passport – reopening the leisure, hospitality and travel sectors and preventing any further lockdowns. It is crucial that such a passport displays test results and, eventually, vaccination status.

In this paper, we offer a series of recommendations to government that, when implemented, will get Britain vaccine-ready.

Pillar 1: Plan and Prioritise Vaccination Rollout

Significant progress is being made in the race for a new vaccine. A number of different types have been developed and several have already reported excellent efficacy ratings in phase III trials. These include:

- AstraZeneca-Oxford: 90 per cent
- Pfizer-BioNTech: 95 per cent – Now Approved by MHRA
- Moderna: 95 per cent

Many more will follow. Each candidate has its own distinct characteristics, and these must be considered at the onset of distribution planning. The variables of each vaccine will dictate its utility and purpose, including:

- Temperature at which the vaccine candidate must be stored
- The number of doses required for each candidate
- The time required between doses
- The efficacy of the candidate

The following table sets out the main vaccine candidates that have been ordered by the UK government, and the key characteristics that will inform the way they are rolled out.

Table 1 – The vaccine candidates ordered by the UK government

Company	Manufacturing Capacity	Number of Doses	Storage Requirements	Doses Ordered by the UK Government
AstraZeneca-Oxford (AZD1222)	3 billion doses over three years	2 shots	Conventional 2 to 8 degrees Celsius, no special	100 million

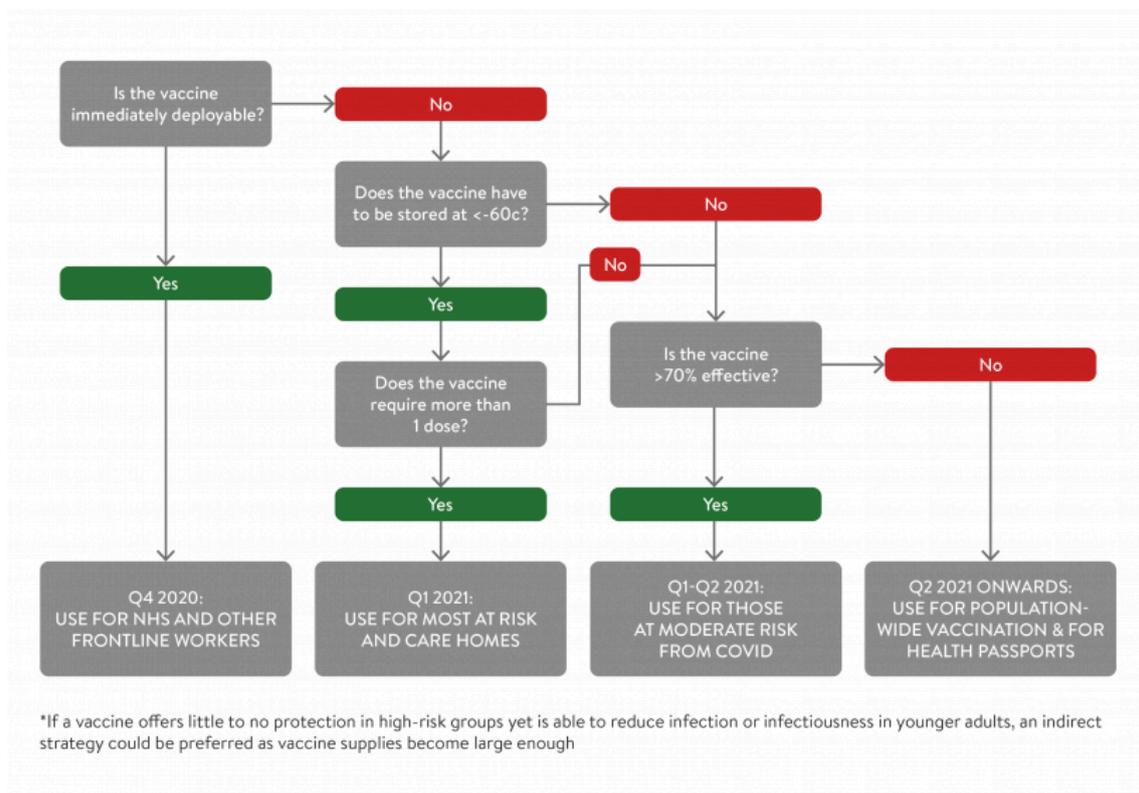
			infrastructure required	
Pfizer-BioNTech (BNT162) APPROVED	100 million doses globally by the end of the year as well as an additional 1.3 billion doses by the end of 2021.	2 shots	-70 degrees Celsius	40 million
Johnson & Johnson/Janssen (Ad26.COVS.2.S)	1 billion doses in 2021 and annually	1 shot	Conventional 2 to 8 degrees Celsius, no special infrastructure required	30 million doses, with an option for an additional 22 million doses
Novavax (NVX- CoV2373)	Over 1 billion doses during 2021	2 shots	2 to 8 degrees Celsius, no special infrastructure required	60 million doses
Sanofi- GlaxoSmithKline (unnamed)		2 shots	2 to 8 degrees Celsius, no special	60 million doses

			infrastructure required	
Valneva (VLA2001)		2 shots	2 to 8 degrees Celsius, no special infrastructure required	60 million doses; two further options for additional doses – one for 40 million and the other, between 30 million and 90 million – by 2025
Moderna	400 million doses per year	2 shots	-20 degrees Celsius, can survive at 2 to 8 degrees Celsius for 30 days	7 million doses

An Ecosystem of Vaccine Candidates

The reality is that there will not be one single vaccine that the UK government uses. Instead, there will be an ecosystem of several vaccines to serve different groups and different purposes, and there will be a combination of vaccines being administered and recorded at any one time. The government should determine how and for whom a vaccine can best be used, and the below decision tree reflects a very simplified organisation of different candidates dependent on their characteristics. As can be seen, this approach allows different types of vaccines to be prioritised, in turn enabling a carefully phased approach to be taken – starting with the vaccination and protection of frontline hospital staff and care workers at the end of 2020. This would likely be done using the Pfizer vaccine, as its storage requirements make it considerably less mobile and therefore more suited to being stored, distributed and administered at a hospital or another fixed primary-care environment. Equally, the decision tree shows that Johnson & Johnson’s vaccine, which is likely to come in 2021, is much more suited to being administered to the population at large and feed into a general health passport because it requires only a single shot to be administered.

Figure 1 – The right candidate for the right job



Direct vs. Indirect Protection

To realise its vision of **protecting the NHS and those most at risk from Covid-19 and allowing us to live safely and freely alongside the virus**, the government must be single-minded in who receives the vaccine. This depends on what job vaccines are proven to do and how effective they are at doing that job.

If vaccines are proven to reduce transmissions, there is an argument to make that they should be administered throughout the population, reducing the transmission of the virus and preventing it from reaching those most at risk from Covid-19.

If vaccines are proven to reduce the occurrence of the disease and are efficacious in the elderly and vulnerable, they should be administered primarily to this group.

What the AstraZeneca-Oxford Trial Will Tell Us

Based on the trial landscape and the data being collected, vaccines are being tested on the basis that they reduce the occurrence of disease. There is one exception: The AstraZeneca-Oxford random control trial has been conducting weekly Covid-19 tests on both those receiving the vaccine and those receiving

the placebo. The headline data from this trial has already revealed the vaccine to be effective at stopping symptomatic disease in recipients.

As more data emerges, we will have a better understanding of **whether those receiving the vaccine are less likely to be infected by the coronavirus**. If this is proven, this vaccine should be administered to the population at large, given the significant number of doses that have been ordered and the manufacturing capability that is now in play.

Towards the Perfect Candidate

There is no single perfect candidate and, as we have long advocated, the government is right to not let the best become the enemy of good enough. We welcome the expedited ecosystem of vaccines that will soon be with us.

As we set out in this paper, vaccines are our way out of the Covid-19 crisis. Given the longer-term need to vaccinate the majority of the population, possibly on a regular basis, the vision for a gold-standard vaccine should be set out now in order to “bend” the research and development processes, and scientists and manufacturers developing vaccines should be further supported with funding. The vaccine of late 2021 should be single-dose, easy to store and easy to administer. These criteria should be refined and set out now.

Recommendations

Excellent work has been done in expediting the development of vaccinations and this should be welcomed. Our previous recommendations on speeding up the trial and approval process have been followed and the government should continue to do all they can to support the science and pharmaceutical sector to rapidly bring safe, effective candidates online. This should be complemented by:

1. Appointing a Minister for Vaccinations who will have power and accountability for the entire vaccine operation.
2. Communicating the decisions that will inform who gets a vaccine, when they will get it and what the characteristics are of the vaccine they will receive.
3. Set out a “gold standard” for the longer-term goal of vaccinating the entire population that will help shape manufacturing and scientific research. This will likely be single-dosage and standard refrigeration-level storage.

Pillar 2: Prepare the Vaccination Infrastructure

The time-sensitive nature of a vaccine's distribution and administration process can create a bottleneck during production. Each vaccine will have its own shelf life – the amount of time the vaccine has left once it is put into a vial for shipment. Once the vaccines are bottled, the countdown begins. So, while several manufacturers are poised to begin bottling their vaccine candidates, most will wait for regulatory approval so as not to waste any vaccine while approval is pending.¹

For example, AstraZeneca said in a written statement that it was making rapid progress to begin supplying hundreds of millions of doses of its vaccine. The vaccine is currently being made in bulk and inventory is being held in the drug substance form until the company gets regulatory approval and can begin to put the substance into vials for shipment. This is done so the finished product can last for as long as possible.²

Once the vaccines are sent to administration sites around the UK, the challenge becomes one of administering as many vaccines as possible before they become unusable. To avoid wasting any vaccine, the NHS published a [reference guide](#) that said some practices may need to be able to deliver vaccinations between 8am and 8pm seven days a week.³

The Pfizer vaccine uses a distribution model built on a “just-in-time system” which will ship the frozen vials to the point of vaccination. They can be stored at -70 degrees Celsius for up to six months but can only be stored at a fridge temperature between 2 and 8 degrees Celsius for just five days.

Preparing the Transportation of Vaccines

Postal and delivery services are working to develop delivery systems capable of keeping up with the impending demand and specific conditions for Covid-19 vaccines. Companies such as the UPS, FedEx, and DHL Global Forwarding have already begun implementing the necessary changes to their delivery systems.

UPS is building two giant freezer farms capable of storing millions of vials of Covid-19 vaccines. The facilities are under construction in Louisville, Kentucky, and the Netherlands, near UPS air hubs, and will house a total of 600 deep freezers that can each hold 48,000 vials of vaccine at temperatures as low as -80 Celsius.⁴

FedEx and DHL Global have been expanding their temperature-controlled transport capabilities. DHL opened a new \$1.6 million facility in Indianapolis, Indiana in the US this month. FedEx is adding freezers,

refrigerated trucks, sensors and thermal blankets to its workforce, according to Bonny Harrison, director of global media relations.⁵

A challenge during the distribution of vaccines to administration sites is the ability to monitor the vaccines during transport. To monitor the temperatures within the shipments of vaccines throughout the journey, Pfizer will use GPS-enabled thermal sensors linked to a control tower in order to track the location and temperature of each vaccine shipment on their pre-planned routes. The GPS devices will allow Pfizer to proactively prevent unwanted deviations and monitor temperatures to avoid wasting any vaccines.⁶

The Right Temperature for the Right Place

One challenge for vaccine storage is the temperature at which the vaccine needs to be kept. For AstraZeneca-Oxford, J&J, Novavax, Sanofi-GSK, and Valneva's vaccine, a storage facility able to provide temperatures between 2 and 8 degrees Celsius is required, which is the average temperature for a standard refrigerator. These can therefore be administered at a doctor's office or pharmacy without needing specialised equipment or infrastructure.

The Department of Health and Social Care said that it has provided an additional £150 million to GPs to support the vaccine rollout over the coming months.⁷ This could be used to purchase additional storage fridges or freezers for vaccines if necessary.

Moderna and Pfizer's vaccines need to be kept at -20 and -70 degrees Celsius respectively, when being shipped and stored. Moderna's vaccine can be stored for up to six months at -20 degrees Celsius. Once thawed, it will only last 30 days at a temperature between 2 and 8 degrees Celsius. This level of stability at refrigeration temperatures allows for storage at most pharmacies, hospitals, or physicians' offices. Once the vaccine is taken out to be administered, it can be kept at room temperature for twelve hours.

The low temperature necessary for Pfizer's vaccine presents a particular challenge as most GPs and pharmacies will not have deep freezers that are this cold; there are no other approved drugs that require storage at this temperature. Only large medical centres, universities and possibly some public-health departments are likely to have such low temperature, deep freezers.⁸

To make it more suitable for pharmacies, the company has developed a reusable, suitcase-sized shipping container that can hold 975 doses of the vaccine on dry ice. The vaccine is stable for ten days from the point of departure in this case. If more dry ice is added, the vaccine can be kept in the case for another 15 days.

Deep freezers that can store Pfizer's vaccine are commercially available for purchase. These can cost between \$5,000 and \$15,000, but manufacturers anticipate months-long back orders and delays for these products.⁹

Some countries have begun to purchase additional infrastructure and equipment to make the vaccination rollout possible on a large-scale. For example, Germany plans to set up 60 special vaccination centres equipped with ultra-low-temperature freezers.¹⁰

Administering Vaccinations

A Network of Vaccination Sites

The BMA GP committee England and NHSEI have agreed on an ES (enhanced service) in which general practices will lead the initial Covid-19 vaccination programme. Other short-term vaccination sites include pharmacies, hospitals, and mobile units.

Based on limited supply and potentially challenging storage conditions, the current assumption is that the jabs will need to be done through groups of practices working together, likely along primary care network geographies, with one GP office as the designated vaccination site. Local pharmacies could be commissioned where GP coverage is not sufficient.¹¹

Mobile vaccine units could also play a vital role in the administration of vaccine jabs. These types of units have been successful in the past at reaching both rural communities as well as those in cities.

Mobile testing units were used in West Virginia in the US during the H1N1 pandemic in 2009 in order to reach the populations living in rural, isolated areas that did not live close to GPs or vaccination clinics. The jabs were given out of a 30 foot, pull-behind trailer that was modified to meet the needs of a mobile vaccination initiative.¹²

In April, Boston Medical Centre set up mobile testing units around the city as well one stationed in the hospital's car park in order to continue routine vaccinations for children and young adults throughout the first wave of the pandemic. This has helped avoid a backlog in routine vaccinations and could be repurposed to accommodate Covid-19 vaccinations.¹³

For longer-term planning, there should be the option for other locations to receive accreditation to administer Covid-19 jabs. This is already the case for the yearly flu jab, as Boots, Superdrug, Tesco pharmacies, and Lloyd's Pharmacy are among those authorised to administer doses.¹⁴

At the end of September, nine drive-through flu jab centres opened in Edinburgh to make vaccination more accessible for the elderly and at-risk groups. The sites, which have the capacity to vaccinate up to

500 people a day, were set up at places like Easter Road stadium and the Scottish Government building at Victoria Quay. The drive-through and walk-in flu jab sites are listed on the NHS Inform website with details of which patients should visit them as well as opening dates and times.¹⁵ These sites could serve as a model for designing similar sites for Covid-19 vaccinations.

Recording Vaccinations

The current NHS deployment plan places GPs at the centre of the vaccination rollout system, and rightly so; GPs are among the most trusted actors in the healthcare system, they provide other immunisations throughout the year, and they usually offer the most convenient access for patients. But GPs do also face communication and logistic challenges that can hinder the success of the vaccine rollout.

For example, the need for two appointments to receive both doses of the vaccine will increase the workload for already over-stretched practices and likely reduce uptake among patients. There is a specific window in which patients will need to receive their second dose, so recall becomes essential. Yet when it comes to managing recalls, GPs' current systems – based on flu vaccinations – require manual follow-ups either with phone calls or mailed paper reminders.

As it stands, central guidance is that GPs need to arrange their own systems to manage bookings and recall. GPs are being given a central system to record vaccinations, but crucially they don't provide critical clinical safety information on-site, such as allergies or immunisation history. This must be remedied as soon as possible, and a national framework and standards set from which GPs can select a system that allows for self-booking, automated recall and reminders to maximise uptake, and real-time national data to inform epidemiological models, public-health campaigns and supply chains. There will be no automated data feed from primary care to see how many patients have booked or capacity of sites – critical information in a complex logistical challenge. The system must offer personalised communications from GPs to reassure patients and remote monitoring for any post-vaccination reactions.

Attention should be paid to the speed at which video appointments were introduced to GP practices earlier in the pandemic, radically and successfully updating arcane technology to cater for remote practice. A key player behind this move – accuRx – now sees its health communication software in use in 99 per cent of GP practices in England. Crucial in such rapid national deployment was a national framework of assured systems from which GPs could simply self-install their preferred system.

Vaccine data must be uniformly recorded and be securely accessible in order to feed into a health passport, as set out below.

Phase IV Trials

The vaccine development process does not end when approval happens. There is a critical role that phase IV studies can play in establishing long-term safety profiles of the new vaccine products.¹⁶ In a phase IV trial – also known as a post-marketing surveillance trial or a confirmatory trial – the vaccine is monitored for safety, side effects and efficacy after it has been approved and made available to the public. It is important that it is carried out, as it can ultimately tell us how *effective* a vaccine is, and it also verifies how well it's tolerated and how safe it is. This can be done only in a real-world setting.

Common health-surveillance and data systems across nations – real-world studies that take place after and to complement the vaccine randomised controlled trials – would gather data about the multiple vaccine products in use and their effects on various demographics and ethnicities. Oracle, as part of its Health Sciences Global Business Unit, has already established its Health Management System, which has a module specifically designed to capture such data in a privacy-protected manner.¹⁷ (TBI recently announced [a philanthropic partnership with Oracle](#) to bring the Health Management System to Africa; initially, Ghana, Rwanda and Sierra Leone will use the system to create electronic health records for their vaccination programs for yellow fever, HPV, polio, measles, and Covid-19 as soon as that vaccine is distributed to Africa.)

It is critical to this process that a record of who has had a vaccine, where they received it and any subsequent side effects is maintained. This requires robust data management and interoperable systems to be in play – the same infrastructure that would underpin a health passport.

Building (and Maintaining) Trust in Vaccines

Strategies to promote widespread acceptance of a Covid-19 vaccine must be based on public perceptions, attitudes, and trust. Health-care workers play a vital role in promoting this acceptance. For example, [a systematic review](#) of the shingles vaccine that evaluated uptake among older adults found that recommendations from primary-care physicians consistently played a significant role in generating high demand for the vaccine.¹⁸

The UK government should consider partnering with the Vaccine Confidence Project at the London School of Hygiene & Tropical Medicine on a public information campaign. Vaccine uptake requires public trust in government, and this could help prepare the British people for the rollout of vaccinations. The current trust deficit must be addressed immediately and needs to be an ongoing effort.¹⁹

Rebutting the Anti-Vaxxers

Anti-vaccination protests and narratives are not unique to the Covid-19 vaccine. But the nature of this pandemic has heightened the need to address anti-vaccination theories, especially on social media. In the hopes of beginning vaccine rollouts as soon as possible with high uptake among the first groups to be eligible for jabs, ministers need to get a handle on misleading anti-vaccination narratives now.

In August 2019 the government launched a “rapid rebuttal unit” tasked with providing instant responses to “media myths and half-truths” about the risks of a no-deal Brexit.²⁰ A similar rebuttal unit is necessary to address inaccurate claims and damaging narratives shared by anti-vaxxers online.²¹ The spread of misinformation will only hinder a vaccine’s ability to reduce the spread and prevalence of Covid-19 in the UK and around the world.

Recommendations

1. Ensure there is sufficient cold-temperature storage and transport infrastructure, including dry ice and freezers.
2. Prioritise vaccines that can be stored at above zero degrees Celsius where substantial transportation is required.
3. Provide a framework and standards for data collection at GP surgeries that will update a patient’s data record and contribute to their health passport.
4. Execute a communications campaign addressing the common misconceptions of vaccines and establish a “rapid rebuttal unit” to deal with online misinformation.
5. Prepare for phase IV trials through the piloting and introduction of a health-record system.
6. Build an accreditation system that permits different settings to administer Covid-19 vaccines and update a recipient’s health passport.

Pillar 3: Protect the NHS and those most at-risk for Covid-19 in Q4 2020

The current reality is that there will not be enough doses to immediately vaccinate the entire UK population, so prioritisation will be necessary. The government should quickly introduce vaccinations to the NHS and to those who are most vulnerable. Based on what we know about these groups and how many vaccines will be available in 2020, there is an opportunity to do this in the next four weeks.

Prioritising the NHS and Those at Risk

In order to protect the vulnerable from the dual threat of Covid-19 and the seasonal flu, the government has extended the eligibility for free flu jabs. Prior to Covid-19, NHS workers, social-care workers, and those over age 65 were entitled to free yearly flu jabs. Because of Covid-19, from 1 December this group will grow to include individuals aged 50 to 64. ²²

The prioritisation for Covid-19 vaccine jabs should take a similar approach and initially focus on NHS and frontline workers as well as individuals over 80 years of age. The progression of prioritisation should look similar to the interim plan proposed by the government: ²³

- All those 80 years of age and over and health- and social-care workers
- All those 75 years of age and over
- All those 70 years of age and over
- all those 65 years of age and over
- High-risk adults under 65 years of age
- Moderate-risk adults under 65 years of age
- All those 60 years of age and over
- All those 55 years of age and over
- All those 50 years of age and over
- The rest of the population (priority to be determined)

A Hospital-First Approach

Hospitals across the UK will serve as ideal settings for early administration of Covid-19 vaccines because they will have access to the deep freezers necessary to store Pfizer's vaccine candidate (likely to be one of the first online) and NHS workers will need to be vaccinated first and can do so at hospitals.

Based on publicly available data, it is estimated that there are nearly 700,000 frontline workers in the NHS that will need vaccinating during the first phase of vaccinations. These frontline workers include all hospital and community health services (HCHS) doctors, qualified nurses and health visitors, midwives, qualified scientific, therapeutic and technical staff and qualified ambulance staff.²⁴

In addition to the frontline workers that make up the highest-priority group for vaccinations, this cohort also includes the over 3 million individuals that are 80 years old and above.²⁵

In terms of other care workers, there are around 2.6 million adult social-care jobs in the UK (or 1.8 million full-time equivalent roles).²⁶ About 700,000 of those carers work in residential care and nursing homes.²⁷ As Covid-19 spread rampantly throughout care homes, the government should also prioritise the 410,000 elderly care-home residents around the UK.²⁸

As vaccines continue to come online, priority can then grow to include the nearly 9 million people between the age of 65 and 79 in the UK that should be eligible for early rounds of vaccinations in 2021 due to their increased susceptibility to severe Covid-19 infections.²⁹ There are also around 2.2 million people on the government's shielding list who suffer from serious underlying health conditions that make them more vulnerable to Covid-19.³⁰

Vaccines to Be Administered in 2020

In total, there are around 5 million³¹ people who need to be vaccinated in the first wave of vaccinations, which includes NHS frontline workers, care-home workers and residents, and individuals over 80 years old. According to publicly available data, the combination of the Pfizer and AstraZeneca vaccines purchased by the government equates to just over 7 million³² applications (assuming two doses per person) in December. Pfizer is approved and we await news of AstraZeneca..

With what we know from available information on vaccines and vulnerable populations, we believe the government should set the ambition target of vaccinating a large part of the NHS's 700,000 frontline workers by the end of the year. This would require 1.4 million doses of either the Pfizer or AstraZeneca vaccine as each requires the jab to be administered twice.

Distributed Vaccines by Population

These recommendations are similar to the allocation of the H1N1 vaccine in the US in 2009. In that case, each state received population-based amounts of the vaccine and local governments then decided how to distribute vaccine supplies within communities based on priority group recommendations from the CDC's Advisory Committee on Immunization Practices (ACIP). ³³

The ACIP identified priority groups as health-care workers, pregnant women and children, with the goals of minimising the burden of illness, protecting health-care-system functions, and targeting key groups responsible for large amounts of disease transmission. ³⁴

Vaccination rollout plans will depend, in part, on which vaccines are deployed. For example, AstraZeneca's and J&J's vaccine candidates can be stored between 2 and 8 degrees Celsius and can be administered at a doctor's office or pharmacy, while Pfizer's requires storage at -70 degrees Celsius and will require special procedures and precision operations to deliver.

Recommendations

1. In December, the government should distribute approved Pfizer and any other approved vaccines to:
 1. 700,000 frontline NHS workers
 2. 700,000 care-home workers ³⁵
 3. 3 million aged 80 or over
2. Prepare hospitals to store and administer vaccines that require cold-storage facilities (Pfizer and Moderna vaccines)
3. Prioritise refrigerated vaccines for community rollout, including care homes
4. Scale and run mass testing concurrently
5. Deploy therapeutics to those who are infected early and hospitalised

Pillar 4: Provide a Health Passport So People Can Live Safely and Freely Alongside Covid-19



The ultimate goal of an effective vaccine programme should be to enable us to live safely and freely alongside the virus. A key part of this will be ensuring individuals have access to a health passport that shows their current vaccine status. Such a passport must interact with the testing system (with the goal of mass testing), where the data from each test is recorded and submitted to the cloud. The right health passport will include the capability to interact with both the testing and vaccine regimes relating to Covid-19, showing:

- Next testing date
- Current testing status (antigen and antibody)
- Vaccine date and location
- Vaccine status including expiry date

The digital health passport would mean that those with an up-to-date negative Covid-19 test or a vaccination would not be subject to strict Covid restrictions and would be able to access settings such as:

- The workplace
- Hospitality venues
- Sporting events
- Concerts

The Premier League is already believed to be in discussion with the Department for Digital, Culture, Media and Sport on how such a system could allow fans to return to stadiums next year.

It would enable a person to show they are Covid-safe, and give people working in those settings a quick, reliable and secure way to verify this.

Aligning Data on Testing and Vaccination Status

A health passport is not only vital in giving a framework for vaccinations and helping those who have been vaccinated show their status, but, as set out above, to align this information with the testing regime.

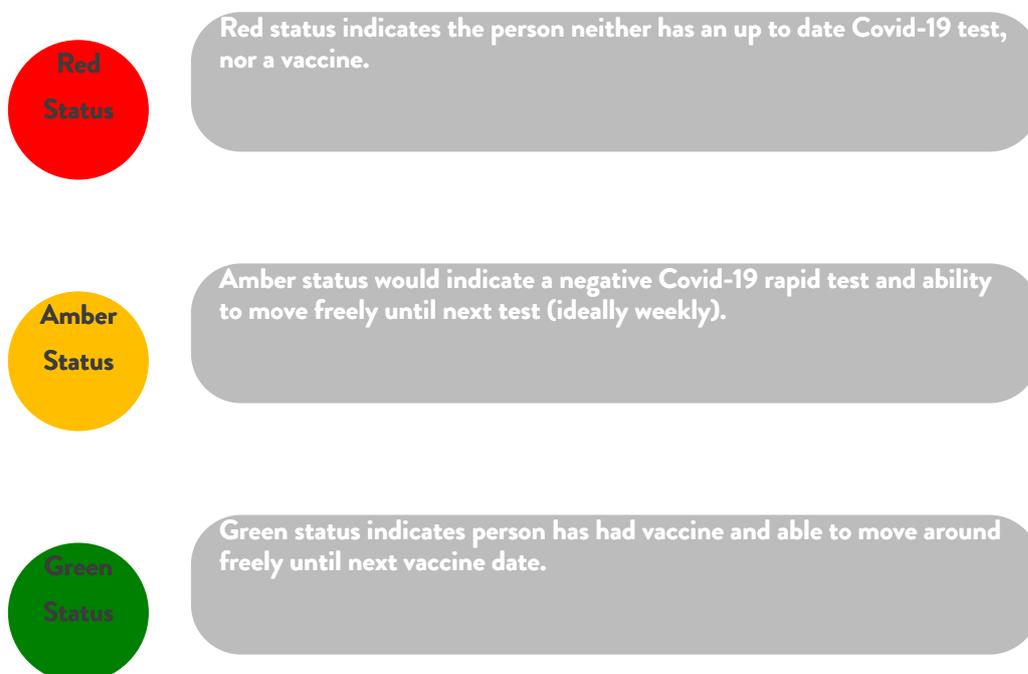
We have [written previously](#) on the key elements of how to operationalise a health ID, including what security measures are required to ensure privacy and the protection of data.

For these purposes we believe an effective health passport must be able to draw on the following data:

- A regular weekly rapid-testing regime
- Testing in institutional settings, for example education and workplace settings
- The testing done through NHS Test and Trace (PCR testing)
- Antibody testing, particularly as a clearer picture emerges on immunity

This data would feed into a citizen's digital health ID which would be required to enter certain venues, with an offline, paper-based version also available. A simple status, set out below, would indicate whether someone has received the vaccine and/or has an acceptable test result, allowing them to move freely.

Figure 2 – Vaccine and testing passport statuses



Health Travel Passport

One of the key functions of this health ID will be allowing people to get moving and travel again. There are a number of potential systems emerging that can fulfil this role. One of them, geared towards a health passport for travel, is CommonPass.



To address the need for a common health passport, the World Economic Forum and The Commons Project Foundation launched the Common Trust Framework for health-status verification.

The Common Trust Framework is designed to ensure that only verifiable lab results and vaccination records from trusted sources are presented for the purposes of cross-border travel.

The Framework includes a global registry of approved labs and vaccine sites, standard formats for lab results and vaccination records, and standard tools to make those results and records digitally accessible. This approach is similar to China's proposal on health code mutual recognition.

The Framework also creates a common global format for governments to publish their health screening entry rules and a global repository of those rules, making it easier for travellers and the travel industry to understand and comply with each jurisdiction's requirements.

Built on the Common Trust Framework, the World Economic Forum and The Commons Project Foundation are launching CommonPass, a platform to allow individuals to document their Covid-19 status electronically and present it when they travel.

Countries would implement their own border-entry and health-screening requirements, including whether and what type of lab tests or vaccinations are required. CommonPass then verifies that incoming travellers' health data satisfies the destination country's entry requirements and generates a green travel certificate that airlines and countries can rely on to allow someone to board a flight or enter a country.

The Role of Testing

The current first-generation vaccines under discussion in this paper are largely multiple use, or geared at reducing the severity of symptoms, not triggering immunity. On this basis, testing will remain a critical part of the Covid-19 infrastructure for the foreseeable future.

As we have set out previously, the UK urgently needs to put in place the right strategy on mass testing. This must be built on rapid tests, and testing as many people as possible as often as possible. [9](#)

Early Administering of Therapeutics

Mass testing also triggers another important measure: the administering of therapeutics. Already, drugs such as Dexamethasone are being used to great effect in hospitals and have led to a decrease in the death rate of Covid-19. Other promising drugs, particularly antibody cocktails, are coming online and the UK has pre-ordered at least a million doses that should start becoming available in the first half of 2021.

These drugs are most effective if they are administered early in the infection lifecycle. Because most people recover from Covid-19 without serious symptoms, giving the drug to a general population would waste the limited supply. The medication is also not helpful to patients with severe symptoms. In the US, the FDA has warned that the drug “may be associated with worse clinical outcomes” in people requiring high-flow oxygen or who are on ventilators. Pharmaceutical company Lilly advises infusion within ten days of symptom onset. For antibody cocktails to be effective, healthcare professionals need to identify and reach people quickly, and that will depend on ramped up and efficient testing capacity. Mass testing will identify those most at risk at the earliest stages of the disease, and they should be provided with antibody cocktails. This information must also be captured in any health passport.

Mass Testing Is Working Around the World

In recent weeks, there have been a number of examples of mass testing being carried out. These include population-wide testing in Slovakia, large-scale testing in Liverpool, city-wide testing in China, and useful micro-level examples such as the testing being carried out by the University of Illinois. These cases are set out below. What they show is that by drawing on rapid tests, utilising the right incentives and collecting data, mass testing can enable people to move freely again. The UK can draw on these examples, expand further and faster and ensure our mass testing regime, coupled with the right health ID, enables us to live safely alongside Covid-19, in a new normal.

Slovakia

Slovakia recently carried out a series of large-scale Covid-19 mass tests.

The country tested 3.6 million people (97 per cent of the eligible population of 10- to 65-year-olds). The process identified 38,000 new cases in two days, which is 15 times more than Slovakia’s testing system identifies on an average day. [36](#)

The overall operation took 17 days. It drew on 40,000 personnel (15,000 healthcare workers and 8,000 members of the country's armed forces and volunteers). Five thousand test sites were set up, each run by 6 to 8 people.

This was organised through a high-level publicity campaign, utilising the country's electoral roll and using a carefully calibrated mixture of incentives. Slovakia drew on rapid antigen tests, which give results within 15 minutes and do not require a lab, to be able to deliver this large-scale population testing exercise.

In order to ensure compliance, the country used a carefully calibrated mix of carrot and stick. Most important among the incentives was the granting of a certificate for those who took part and tested negative. This certificate enables the bearer to exit the curfew regime, go to non-essential shops and go to work. For those not taking part in the testing the assumption then became that the person is positive for Covid-19 and needs to isolate.

This case study provides useful insight on how the UK can move to a position of regular national testing. But we should do more and faster. Such a testing regime should be implemented here, but with the results captured electronically, aligned with data emerging from the vaccination programme, and held in a transportable health ID that can be updated when a test result expires or a vaccine is administered.

Liverpool

In recent weeks Liverpool has been piloting the UK's first mass-testing programme.

The process is drawing on rapid antigen tests to identify asymptomatic carriers, and ramped-up PCR testing for those with symptoms.

Recent results have been released by Liverpool Council:

- 92,683 lateral flow tests have now been carried out.
- 77,229 tests were carried out on Liverpool residents, with 15,454 conducted on those living in surrounding areas who work in the city.
- Case numbers stood at around 700 per 100,000 in mid-October but are now under 280 per 100,000. [37](#)

China

China has conducted a number of large-scale mass tests in recent weeks.

In late October, the Chinese Government tested all citizens in the city of Kashgar (4.7 million people) after a regional outbreak of Covid-19 in Xinjiang province.

Earlier in October, the city of Qingdao tested the whole of its population (9 million people) over a period of five days.

In May, China tested the entire population of Wuhan (11 million people), over a period of ten days.

Through steps such as these, China has largely managed to keep the virus under control.

University of Illinois

The University of Illinois conducts twice-weekly testing for all students and staff across its three campuses. The project, named Shield Campus, saw more than 300,000 tests conducted in the four weeks to 11 September. This was roughly 2 per cent of all tests in the US.

The programme uses RT-PCR saliva-based tests which are conducted in a lab. The turnaround time from sample to result is usually between six to eight hours and a rapid action team interacts with individuals once a confirmed positive result is obtained. The university's data show how critical this is as delays in contact tracing have obvious consequences for its hyper-mobile and social student population. Campus positivity is currently below 0.31 per cent and outbreaks – associated with unofficial parties – have already been identified and squashed. All students and staff are regularly tested, with frequency for each group determined by modelling that determines risk. Some students are tested three times a week while faculty and staff are tested once weekly given their respective measured risk. ³⁸

A Challenge of Organisation

With more and more rapid tests coming on stream, the most urgent challenge facing the government on this issue is one of organisation, not supply.

The government needs to focus on bringing these tests online as quickly as possible and then organising how and where they are used.

Drawing on these additional tests, and testing capacity of the type set out above, the government must ensure there is the right framework for testing in key settings.

This will involve, but not be limited to:

1. Ensuring the appropriate tests –rapid antigen, LAMP, PCR and so on – are made available in the requisite numbers.
2. Support to ensure lab-processing facilities are available, for instance via mobile-testing trucks and partnering with local lab facilities.
3. Putting in place the right testing regime, focused on frequency of testing and speed in turnaround of results.

4. Those needing to isolate should be given the right support financially and access to further testing to ensure they isolate only for as long as is needed.
5. Finally, it is vital that the data from all of those being tested, through whatever testing mechanism, is captured and stored centrally, feeding into a health passport.

Alongside these steps, it is important the government develops and communicates the right mixture of incentives for people to take part in the mass-testing regime and see a health ID as a bridge to participate economically and socially as safely and freely as possible. For each result, the following would apply:

Table 2 – In a mass-testing operation, what do test results mean?

Test Result	Leads to:	Expiry
Negative – The patient does not have Covid-19	<ul style="list-style-type: none"> • Enter hospitality settings • Attend sporting and cultural events • Attend work in person • Move and travel freely • Repeat lateral-flow test 	72 Hours
Positive	<ul style="list-style-type: none"> • Confirmatory RT-PCR test • Isolation until a negative result RT-PCR result is obtained or no symptoms after 14 days • Accesses targeted financial and mental-health support • Immediate access to therapeutics for those deemed at risk 	Until a negative RT-PCR test or 14 days without symptoms, whichever is sooner.

The Importance of Data Collection

In the coming months we will have multiple types of tests in play results will be captured in different ways. Some will be uploaded to a cloud-based platform by a GP or a private pharmacist, others may be

user-administered with an app. It's imperative that whatever the *type* of tests, results are stored in a uniform way and the interplay between different types of tests is properly understood. This will provide the infrastructure for an eventual health passport.

Bring onstream all possible viable tests and support those in development: With a validation framework in place, the government should bring onstream all possible viable rapid tests. This will also enable them to work openly and support those British companies with tests in development.

Underpin the entire testing regime with robust data collection and support the public to understand what tests results lead to: A communications campaign must be in place for the start of the testing regime, providing online resources that allow citizens to properly understand the role, purpose and interoperability of different tests, as well as what a positive or negative test means. Consideration should be given to a live portal that gives a real-time overview of the Covid-19 situation in the UK. This will only be made possible if a robust data collection platform is used that allows results from different types of tests – even if administered in different ways – to be stored uniformly.

Ensure this data is fed into the wider framework of a health passport: A system that accumulates people's up-to-date testing data and, soon, their vaccine status is now becoming urgent. This would form part of one uniform health passport, acting both as a portal with a person's interaction with the Covid-19 healthcare system, but also their ability to travel.

Recommendations

We believe the government needs to take the following steps to make progress on creating a Digital Health ID:

- 1. Implement a mobility credential linked to a secure and user-centric digital identity to allow the safe reopening of close-proximity spaces.**
 - Adopt a secure and user-centric model of digital identity that puts individuals in control and protects their privacy. For people this would most likely mean a biometrically secured app on their phone that stores digital credentials.
 - Create a platform to securely issue credentials based on test results. For example, someone would present their digital ID when being tested; a unique credential based on their results would then be sent to their app.
 - Agree internationally interoperable standards for credentials so that they can be widely recognised by a range of organisations. When required, users would present a mobility credential on their app to be scanned and verified.
 - Set out a technical, legal and liability framework for identity providers, credential-issuing parties (e.g. testing labs) and verifiers to accelerate delivery.

2. Set the right framework for how credentials are used in practice, in order to secure broad-based public support.

- For public settings, enforce access based on a mobility credential in the highest-risk settings first, e.g. care homes and airports. As rapid point-of-use tests become more available, credential-based access can become more widespread.
- For private settings, e.g. offices, use credential-based access as the condition for increased occupancy rates. The right to ask people to show a mobility credential should be limited to those authorised to secure such settings.
- Prevent anyone from being compelled to share a mobility credential outside of these settings except by the police. Similarly, the power to issue penalties for failing to show a credential should be limited to official authorities and only when strictly necessary.
- Ensure that a digital-identity platform and mobility credential remains independent of any digital contact-tracing efforts, unless users opt in to linking their data.

3. Make the creation of a health passport a top priority in government.

- The creation of this system should be the responsibility of a Minister for Vaccinations.
- The right cross-disciplinary team should be recruited to oversee this project, reporting to the minister.
- Urgently stress test and draw on the right data collection process and platform. Systems such as Oracle and Common Pass should be looked at, with discussions taking place with key international partners to ensure common standards are met.
- Deploy health passport across all groups by next summer.

Conclusion

As this document sets out, to be prepared for the next phase of learning to live safely alongside Covid-19, we need to:

- **Go further and faster on vaccines**, bringing viable vaccines onstream as soon as possible, rolling them out through a clear structure of prioritisation.
- **Draw on best practice to bring in mass testing as soon as possible**, learning from examples such as Slovakia, the University of Illinois and the pilot in Liverpool the UK to expand mass testing, utilising rapid tests and testing as many people as possible, as often as possible.
- **Centralise and collect data**. It is critical the government collects all possible data on those being tested, the results of the tests and align this with key information from the vaccination programme.
- **Introduce a health passport that is able to draw on multiple data sources, including testing, therapeutics and vaccination data**. This would feed into a tech-based health passport that enables people to move freely again.

We believe it is possible, by summer next year, to be in a position where citizens have access to a viable health ID, that displays their interaction with a mass testing regime, and/or, where appropriate, whether they have been vaccinated.

Such an approach will enable us to navigate between the current end of the second national lockdown and a stage where most people will be able to be living normally again.

Recommendations

Vaccine rollout:

- Appoint a Minister for Vaccinations who will have power and accountability for the entire vaccine operation.
- Communicate the decisions that will inform who gets a vaccine, when they will get it and what the characteristics are of the vaccine they will receive.
- Set out a “gold standard” vaccine vision for the longer-term goal of vaccinating the entire population that will help shape manufacturing and scientific research. This will likely be single-dosage and standard refrigeration-level storage.

Vaccine infrastructure:

- Ensure there is sufficient cold-temperature storage and transport infrastructure, including dry ice

and freezers.

- Prioritise vaccines that can be stored at above zero degrees Celsius where substantial transportation is required.
- Provide a framework and standards for data collection by GP surgeries that will update a patient's data record and contribute to their health passport.
- Set up a communications campaign and rebut anti-vaccination theories.
- Prepare for phase IV trials.
- Build an accreditation system that permits different settings to administer Covid-19 vaccines and update a recipient's health passport.

Protecting those most at risk:

- In December, the government should distribute Pfizer and other approved vaccines to:
 - 700,000 frontline NHS workers
 - 465,000 care-home workers
 - 3 million aged 80 and over
- Prepare hospitals to store and administer vaccines that require cold-storage facilities (Pfizer and Moderna vaccines).
- Prioritise refrigerated vaccines for community rollout, including care homes.
- Scale and run mass testing concurrently.
- Deploy therapeutics to those who are infected early and hospitalised.

Creating a health ID:

- Implement a mobility credential linked to a secure and user-centric digital identity to allow the safe reopening of close-proximity spaces.
- Set the right framework for how credentials are used in practice, in order to secure broad-based public support.
- Make the creation of a health passport a top priority in government.

Many times throughout the response to Covid-19, the government has found itself behind the decision-making curve. While progress on testing, for instance, is notable, what is needed is for the government to take the right steps to ensure we end the current cycle of lockdowns and restrictions.

By following the recommendations set out in this paper, we believe all citizens can have access to an innovative health passport by next summer, enabling them to demonstrate their interaction with the UK's mass-testing regime and vaccination programme.

This will get the country moving again, with us living safely and freely alongside the virus. This report is a roadmap and offers a credible plan that will lead government to the light at the end of the tunnel.

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