EXECUTIVE SUMMARY

• The COVID-19 pandemic rages on with an average of over 40,000 daily new confirmed cases in the United Kingdom (UK), an all-time high. Over 400 people a day die with the virus, and lockdown measures necessitated by the virus continue to cause further harms. The fastest and safest way out of this crisis is mass vaccination.

• In international terms, the UK was the first to begin vaccinating and is well-ahead of other European countries and narrowly ahead of the United States. Nevertheless, at the current rate Phase 1, one dose for vulnerable groups, will not be completed until late 2022.

• It is both possible and necessary to accelerate Britain’s vaccination programme. Israel has been vaccinating as much as 10-times faster than the UK per head.

• The current Government target, one million doses per week, would mean Phase 1 would not be completed until August 2021, well after Prime Minister Boris Johnson’s target for “back to normal” by Easter.

• The pandemic is hugely costly to both the Government and the economy more widely. Every additional week of the pandemic costs the taxpayer £6 billion, while reducing economic activity by £5 billion. There are also countless harder to quantify costs, for example, declines in pediatric vaccinations, cardiovascular admissions, and endoscopic services and mental health.

• Speeding up the vaccination effort to 6m people a week could save as many as 50,000 lives.

• The huge costs of the pandemic justify a “war effort” to accelerate vaccinations and end the crisis.

• Britain’s vaccination programme is being hampered by an excessively centralised, command and control approach that has rebuffed help from the private sector, the armed forces and volunteers.

• If the Government wants to rapidly speed up vaccinations, protect the vulnerable and end the pandemic they should set a target of six million doses per week, matching Israel’s speed at scale. It will also be necessary to create a Number 10 ‘War Room’ dedicated to accelerating the vaccination programme, empowered to remove bottlenecks.

• The COVID-19 pandemic is an extraordinary challenge. The UK has an opportunity to lead the world in putting an end to the crisis — but it will take a new ambitious approach to the vaccination challenge.
HOW TO INCREASE SUPPLY AND DISTRIBUTION

1. Fully call up the Armed Forces and reservists with expertise in field hospitals and logistics;
2. Commission pharmacies with pre-existing venues and skills in administering vaccinations, as is done in the annual flu vaccination programme;
3. Use closed hospitality and other venues such as hotels, which are equipped with commercial grade refrigeration to store the Oxford/AstraZeneca vaccine, with support from local medical professionals;
4. Use public venues, like places of worship, public housing, community centres, school gyms etc., with support from local medical professionals;
5. Create drive-in centres, as have been successfully deployed in Israel;
6. Launch mobile vaccination centres, to ensure vaccines can be provided to more remote and harder to reach communities;
7. Provide 24/7 vaccination services with Government subsidising overtime and late shifts;
8. Allow walk-in services for “spare” appointments and doses, so any gaps or unused doses are used;
9. Extend criteria immediately to include all priority group individuals, including those aged over 55 and younger with vulnerabilities, to ensure maximum use of available doses.
10. Accelerate and expand use of the “Jabs Army” and volunteers, to provide sufficient vaccinators and logistics staffing;
11. Simplify staff onboarding requirements, to avoid needless hindrance to volunteering;
12. Increase payments to GPs and local health professionals per vaccination, to ensure maximum possible effort dedicated to vaccinations;
13. Develop an online booking platform, to maximise the booking of appointment slots;
14. Reward attendance at vaccination appointments if “no-shows” prove to be a bottleneck, with cash rewards (at traditional centres) or shared rewards (at repurposed hospitality venues, like a takeaway pint);
15. Online delivery of home injection kits for those willing and able to do so (e.g. diabetics who currently self-administer injections, accompanied by a self assessment and video supervision to mitigate risks);
16. Launch a marketing campaign to encourage appointment booking;
17. Award prizes for best employees and centres, to identify and reward best practice and vaccinating at higher rates;
18. Crowdsourcing ideas, from both the country broadly and from staff on the front line about how to accelerate vaccine delivery, including financial rewards for ideas that are introduced;
19. Clarify delivery schedules and negotiation of increasingly rapid supplies for the Oxford/AstraZeneca and Pfizer/BioNTech vaccines;
20. Provide market commitments for input materials, such as glass vials, to remove any supply bottlenecks;
21. Immediately approve the Moderna vaccine for order and distribution, given its approval by the U.S. Food & Drug Administration, while UK processes complete; and,
22. Proactively plan for and stock the Novavax vaccine, pending completion of its phase 3 clinical trials and UK approval processes;
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This paper is written in a personal capacity and does not reflect the views of the authors’ employers or clients, past or present.
INTRODUCTION

AS THE COVID-19 PANDEMIC RAGES ON, MASS VACCINATION PROVIDES HOPE OF ESCAPE

The COVID-19 pandemic continues to cripple life in the United Kingdom (UK). Despite significant Government restrictions keeping most of the country locked down under the tier system, it is clear that this system will not eradicate the virus, nor is it tolerable in the medium to long term.\(^1\) COVID-19 continues to spread rapidly, with a 7 day rolling average of over 40,000 daily new confirmed cases, an all-time high (See Figure 1).

\[\text{Figure 1: Daily new confirmed COVID-19 cases in the UK}\]

![Daily new confirmed COVID-19 cases in the UK](image)

The rolling 7-day average. The number of confirmed cases is lower than the number of actual cases; the main reason for that is that testing understates the true number of cases.

Source: Our World In Data

The daily average deaths from COVID-19 in the UK has reached over 400 people since November, with over 75,000 confirmed deaths since the pandemic began.\(^2\) More British civilians have died from Covid since February than were killed in the entire Second World War.\(^3\)

To protect the vulnerable and return the country to normal, mass vaccination has to take place as fast as possible. The scientists have delivered their side of the bargain, developing vaccines and testing them at a rapid pace and far sooner than

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3. https://www.parliament.uk/business/publications/research/olympic-britain/crime-and-defence/the-fallen/#:--text=In%20WWII%20there%20were%20384%2C000,half%20of%20them%20in%20London.
many experts predicted. The UK has now approved two COVID-19 vaccines for use, those developed by Pfizer/BioNTech and Oxford/AstraZeneca. The Moderna, Novavax and Janssen vaccines are also currently at various stages of development and review.

The Government, following the advice of the Joint Committee on Vaccination and Immunisation (JCVI), was right to order many different vaccines. It was not initially clear to what extent the differing vaccines would be effective, or on what timescale they would be delivered. The advantage of the Oxford/AstraZeneca vaccine is that it can be stored at fridge temperature of 2°-8° Celsius, an opportunity that this paper will explore further. By comparison, the Pfizer/BioNTech vaccine must be kept at minus 70 degrees Celsius, colder than an Antarctic winter, presenting additional logistical challenges.

The vaccines will save lives. Every 20 vaccinations provided in care homes will save one life. There are different estimates of efficacy of the two approved vaccines, but the crucial point and the one reiterated by the deputy Chief Medical Officer, Jonathan Van Tam, is that there were no hospitalisations for coronavirus after a 10 day period following either of the approved vaccines. This will cut deaths dramatically and reduce hospitalisations, which are putting huge pressure on the NHS.

A NEW GOAL: SIX MILLION DOSES PER WEEK

The UK’s vaccination programme can and must accelerate. We should aim to administer 6 million doses per week at full capacity

The UK was the first western country to approve a vaccine, and has now administered a dose to one million people since December 8th. In international terms, the

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4 See https://www.nytimes.com/interactive/2020/04/30/opinion/coronavirus-covid-vaccine.html One author of this paper made forecasts that a vaccine would be approved by December in the UK. See https://twitter.com/KitsonJ1/status/1334078831267893248 and https://twitter.com/KitsonJ1/status/1322455241762181120
9 To address this requirement, freezer boxes are used. Note it can (and in fact must be) be stored at fridge temperature for the last five days immediately prior to vaccination
10 https://c8930375-0dbb-4319-ae2f-025f70d4b441.filesusr.com/ugd/ab45f7_a40832c6069842e6a133fcfc2b06611bf.pdf
12 https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)32661-1/fulltext
UK was the first to begin vaccinating and is well-ahead of other European countries and narrowly ahead of the United States. Many countries have yet to even start their vaccination programmes due to sclerotic regulators. However, we must avoid arrogance or complacency. There is little value in comparing ourselves to those who are failing altogether.

Progress is substantially slower than first promised. The UK is administering vaccines at a pace of around 43,000 doses per day or 300,000 per week. The Government’s stated target is to vaccinate one million people per week. This equates to about 1.5% of the UK population — meaning the UK is currently underperforming the target three-fold.

Meanwhile, Israel is racing ahead (See Figure 2). Over the last week, Israel has averaged a vaccination rate that is much as 10-times faster (adjusted for population size) than that of the UK on a rolling weekly basis. Israel has now administered a dose to over 12 per cent of their population. This demonstrates that it is possible to deliver vaccinations much more effectively.

**Figure 2: Daily COVID-19 vaccination doses administered per million people (UK vs Israel)**

*This shows the rolling 7-day average per million people in the total population — this allows us to compare the UK and Israel more fairly, given the UK’s population is about eight times larger than that of Israel. This is counted as a single dose, not the number fully vaccinated which usually requires two doses. Source: Our World In Data & Author calculations*

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14 [https://ourworldindata.org/covid-vaccinations](https://ourworldindata.org/covid-vaccinations)
16 [https://www.thetimes.co.uk/article/nhs-plans-to-vaccinate-one-million-every-week-8xvzk608](https://www.thetimes.co.uk/article/nhs-plans-to-vaccinate-one-million-every-week-8xvzk608)
17 [https://coronavirus.data.gov.uk/details/healthcare](https://coronavirus.data.gov.uk/details/healthcare)
Israel has a smaller population and is denser than the UK (but not England). Never-
theless, Israel is vaccinating more people in absolute terms.\textsuperscript{18} There is no available data comparing how the UK is performing by density of area. Israel’s vaccination programme started later (on 19 December rather than 8 December), so they have not benefited from a “head start”, beyond better planning.

Historical examples also provide a useful guide. The New York Times recently published a feature on New York City’s smallpox outbreak in March 1947. It was ended with a mass vaccination campaign, in which six million people were vaccinated in less than a month.\textsuperscript{19} This required pharmaceutical companies to start 24/7 production lines and the use of city-wide infrastructure and volunteers.

The vaccination programme needs to accelerate if the UK is to meet its current target of 1 million doses per week, but we should not stop there. If we were to match Israel’s speed, scaled up to the whole UK, the new target would be 6 million doses per week.

The virus is significantly more dangerous for the elderly and those with pre-existing conditions (e.g. a younger person suffering from a heart problem). The Government’s Phase 1 plan is thus sensible to administer the vaccine to groups in risk order.\textsuperscript{20} They have identified 32 million people who “represent around 99% of preventable mortality from COVID-19”.\textsuperscript{21}

At the current rate, the UK will not have completed Phase 1 vulnerable group first doses until late 2022. Worryingly, even if the Government does reach their goal of one million doses per week, Phase 1 will still extend to August 2021. This is well behind Prime Minister Boris Johnson’s stated goal for “normality” by Easter.\textsuperscript{22} Moreover, even at that point, the vulnerable would not have had a second dose, which could take the remainder of the year.

A two million a week programme would lead to completion of Phase 1 by May 2021 and a three million a week programme would deliver by April 2021. However, the only way to fulfil the goal of ending the crisis in a timely manner, protecting the vulnerable and facilitating the end of all restrictions, would be to match Israel’s speed, at 6 million a week, that would mean completion by the end of February.

\textsuperscript{18} https://ourworldindata.org/covid-vaccinations#daily-vaccination-rates
\textsuperscript{19} https://www.nytimes.com/2020/12/18/nyregion/nyc-smallpox-vaccine.html
\textsuperscript{22} https://inews.co.uk/news/health/boris-johnson-normality-easter-hit-vial-supply-issues-vaccine-roll-out-814248v
Irrespective of party political affiliations or views on the best approach to combating Covid-19 (from lockdowns to a more laissez faire approach), accelerating vaccinations should be an area of broad mutual agreement.

The challenge to expand dosing capacity is furthered by the need for second doses. The extension of the gap between the first and second doses, from 3-4 weeks to 12, will allow many more to receive an initial dose, which provides a baseline of protection. This does not, however, negate the need for a second dose entirely, which will increase antibody levels and sustain long term immunity. It is therefore essential that capacity is doubled in time for when the first cohort of vaccine recipients requires their second doses. If capacity is not doubled, new vaccinations could be cut to administer second doses to those already vaccinated.

THE COVID-19 PANDEMIC IS HUGELY COSTLY

The cost of the COVID-19 pandemic is so high that it justifies a true “war effort” to accelerate vaccination and end the crisis.

The full cost of the COVID-19 pandemic has yet to be fully calculated but brief reflection demonstrates just how severe our crisis has become, cementing the case for increasing the vaccination target.

Over 400 people are dying every day from COVID-19. Every dose administered potentially saves a life. An acceleration of vaccination could save over 50,000 lives compared to the current Government target.\(^\text{24}\)

The cost of COVID-19 to the public finances has reached approximately £317.4 billion for 2020/21, resulting from lower tax revenues, higher welfare spending, and support for public services, households and businesses.\(^\text{25}\) Of course, the economic impact of COVID-19 won’t be addressed instantly but gradually as policies are changed and the economy recovers. However, the effective daily cost to the Government of the pandemic is £0.87 billion per day or £6.09 billion per week. An accelerated vaccination scenario that cuts the crisis overall by 20 weeks could thus be worth over £120 billion to the Government. This makes it very easy to construct a strong business case for measures that successfully accelerate vaccination even if they come at great financial expense.

Coronavirus has obviously also been extremely costly for the private sector with year-on-year GDP falling around 12 per cent, further than the Depression of 1920/21 and only matched by the Great Frost of 1709. Output is expected to be £336 billion lower this financial year compared to the original March forecast.\(^\text{26}\) This equates to a cost in lost economic output from the pandemic averaging £5 billion per week.\(^\text{27}\)

There are also significant but harder to quantify costs, particularly the impact of behavioural changes, restrictions, and lockdowns on our livelihoods and freedoms. The pandemic has seen a decline in routine pediatric vaccine ordering and administration (according to US data), making children more at risk of outbreak of other diseases despite their minimal risk from COVID-19.\(^\text{28}\) Outcomes for cardiovascular diseases are likely to worsen as hospital admissions declined in this area after lockdown by over half.\(^\text{29}\) We have also seen a major drop in endoscopic services, which could result in delayed cancer diagnosis and thus another source of excess mortality.\(^\text{30}\) The isolation and anxiety cause by the pandemic is hurting mental health, with the ONS estimating a doubling in the number experiencing some form of depression by June 2020\(^\text{31}\) — a trend which has no doubt worsened.

\(^{24}\) This is calculated on the basis that the Phase 1 group represents 99% of preventable mortality and vaccinations timelines are boosted by 20 weeks (so all phase 1 have received a dose and many are being given a second dose) and that the vaccinations prove effective


\(^{26}\) Ibid

\(^{27}\) The UK economy was worth £2.17 trillion in 2019, meaning £260.4 billion smaller as a result of Covid-19, equating to £5.0 billion a week.

\(^{28}\) https://www.cdc.gov/mmwr/volumes/69/wr/mm6913e2.htm#:~:text=The%20ongoing%20COVID%2D19%20pandemic%2C%20outbreaks%20of%20vaccine%2Dpreventable%20diseases.

\(^{29}\) https://heart.bmj.com/content/106/24/1890

\(^{30}\) https://gut.bmj.com/content/early/2020/07/19/gutjnl-2020-322179

\(^{31}\) https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/articles/coronavirusanddepressioninadultsgreatbritain/june2020
CENTRALISATION AND BUREAUCRATIC FAILINGS

Increasing the number of vaccinations is certainly possible, especially now that the Oxford/AstraZeneca vaccine has been approved. But there remain areas of significant concern. The COVID-19 has crisis displayed a litany of bureaucratic failings. This includes Public Health England’s disastrous early decision to centralise testing that meant the outbreak was not stopped, the NHS decision to discharge COVID-positive patients to care homes, and the troubled NHS Test and Trace programme. Prime Minister Boris Johnson has complained about how during the pandemic parts of government “seemed to respond so sluggishly, sometimes it seemed like that recurring bad dream when you are telling your feet to run, and your feet won’t move.”

The Government risks repeating previous mistakes. The vaccination programme is led and controlled exclusively by the National Health Service. Vaccinations are currently only being provided by a limited set of hospital hubs and NHS GPs. This is particularly strange considering the annual influenza vaccination programme is supported by a wide array of public and private actors, including pharmacies like Boots.

*The Times* reports that one-in-four people in England do not live near a vaccination centre, including large towns such as Bedford, Newark and Braintree. London has just eight sites per one million people, the lowest in the country. This is creating a “postcode lottery for those seeking the life-saving jab.”

There are also substantial workforce problems, with the 10,000 person ‘volunteer army’ needed to provide vaccinations apparently not ready. This is no doubt in part because of the extraordinary twenty-one forms required from retired nurses and doctors to volunteer to provide COVID-19 vaccinations. This includes providing proof of competency in fire safety, conflict resolution, human rights and data security. The Health Secretary is reportedly now working to reduce the red tape.

Local public health officials have complained about the slowness of the rollout and the lack of transparency. The public health director for Liverpool, Matt Ashton, complained that the NHS is undertaking a “command and control” approach to vaccinations. “We need much more of a local plan,” Ashton said. Meanwhile,

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32 https://www.adamsmith.org/research/testing-times
35 https://www.nhs.uk/conditions/vaccinations/flu-influenza-vaccine/
36 https://www.thetimes.co.uk/article/postcode-lottery-for-life-saving-covid-vaccination-k9hld6zt3
39 https://www.telegraph.co.uk/politics/2021/01/02/matt-hancock-cut-red-tape-stopping-retired-doctors-signing-covid/
40 https://www.thetimes.co.uk/article/postcode-lottery-for-life-saving-covid-vaccination-k9hld6zt3
the NHS have also reportedly refused to carry out 2 million doses per week.\textsuperscript{41} \textsuperscript{44} “We have never said we will do two million jabs a week. We have to manage expectations,” a health source told The Telegraph.

The rollout of vaccines is being hampered by hostility to outsiders. Offers from hotel chains, including Best Western Hotels and Ibis, as well as Jockey Club and LW Theatres, to provide facilities have been rebuffed.\textsuperscript{42} An organisation called #WeMakeEvents, which represents freelancers and businesses in the live events supply chain, have also not heard back.\textsuperscript{43} The same goes for BrewDog’s offer of closed bars as vaccination hubs, which include waiting areas, huge refrigerators, and staff willing to support the effort.\textsuperscript{44} There have also been unused offers of support from Tesco’s logistics arm, Best Food Logistics to support distribution efforts using their refrigerated lorries and warehouses, and Boots pharmacy.\textsuperscript{45} After much delay, the Health Department has only just, at the start of January, accepted help from military medics — but they have so far called in just twenty-one teams, which equates to a tiny fraction of the full capacity.\textsuperscript{46} This is despite reports that the Defence Secretary offered up to 250 teams who could provide an additional 100,000 vaccinations a day.\textsuperscript{47} It is unclear why these offers have not been fully taken up. The approach to vaccinations echoes previous tendencies towards over bureaucratization.

\section*{HOW TO ACCELERATE VACCINATIONS}

\textbf{The UK should harness the full power of the private sector, army and volunteers to accelerate vaccinations. Bottlenecks and sources of waste in supplying and distributing vaccines must be eliminated.}

To accelerate the speed at which the UK administers vaccines we need to review the end-to-end process. Challenges and opportunities can broadly be grouped into two buckets — supply and distribution. Firstly, ensuring the 140 million doses ordered (100 million of Oxford/AstraZeneca and 40 million of Pfizer/BioNTech) are produced quickly. Secondly, ensuring once those doses have been produced, they are quickly distributed to recipients.

The Chief Medical Officers of the UK have warned “the main barrier ... is vaccine availability, a global issue, and this will remain the case for several months and, im-

\textsuperscript{41} https://www.telegraph.co.uk/news/2021/01/03/challenges-facing-oxford-covid-vaccine-roll-out/

\textsuperscript{42} https://www.telegraph.co.uk/news/2020/12/31/hotels-businesses-offer-services-jab-centres-have-yet-hear-government/

\textsuperscript{43} https://www.telegraph.co.uk/news/2020/12/31/hotels-businesses-offer-services-jab-centres-have-yet-hear-government/

\textsuperscript{44} https://au.news.yahoo.com/sturgeon-thanks-brew-dog-after-founder-offers-to-use-closed-bars-as-vaccination-hubs-132808368.html

\textsuperscript{45} telegraph.co.uk/global-health/science-and-disease/coronavirus-news-covid-vaccine-schools-oxford-closed-lockdown/

\textsuperscript{46} https://twitter.com/tnewtondunn/status/1345875804987813888

\textsuperscript{47} https://www.reuters.com/article/us-health-coronavirus-britain-military/uk-military-ready-to-deliver-100000-vaccine-doses-a-day-defence-secretary-idUSKBN2950R8
portantly, through the critical winter period”. The original agreement targeted 30 million Oxford-AstraZeneca doses available by September 2020, and 10 million Pfizer-BioNTech doses by the end of 2020, but neither target was met, so clarification is required as to the stocks of vaccines held and the schedule of delivery.

By contrast, the suppliers of both vaccines claim to be on schedule to deliver as agreed with the Government. A million doses of the Oxford-AstraZeneca vaccine are supposedly ready for distribution in the first week of January. There are also plans for the supply to reach two million doses weekly by the third week of January 2021. A further three million doses are “stored in vials for immediate use once given safety clearance” and “further 15 million waiting for the ‘fill and finish’ stage — where they are put into glass vials.” These supplies are in addition to existing and additional supplies of Pfizer-BioNTech doses, though precise numbers and delivery dates of this vaccine are unknown and public commitments here are less transparent. Assuming Pfizer-BioNTech is able to build a comparable supply chain to Oxford-AstraZeneca, the UK should soon have between 2-4 million doses of vaccine per week — which the Government should explore increasing further. As a comparison point, India’s Bharat Biotech collaboration with Oxford-AstraZeneca plans to produce 50 million doses per month.

The UK’s vaccine supply chains should be given more proactive scrutiny to avoid further delays like those experienced against original commitments. Public transparency and accountability will be necessary to ensure that targets are both known and met. The Government should forecast potential risks and unforeseen issues across the supply chain to take proactive mitigating action. For example, there has been extended commentary since the summer of shortages of the specialist glass vials required for vaccines as suppliers were hesitant to commit to production. However, this is a competitive market and the Government could subsidise accelerated production. Figures 5 and 6 below explore potential vaccine supply and distribution acceleration opportunities further.

While vaccines supplies are insufficient to meet our ambitions in the immediate term, they should provide scope to go well beyond the Government’s target and suggest supply issues are not (yet) the primary bottleneck. The Government should aim to make distribution so efficient that all supplied doses are rapidly used. In simple terms this means increasing the points of distribution (i.e. number and

48 https://www.ft.com/content/d97c72c5-ed23-4c2b-bf1c-9cc10b2f007
51 https://uk.reuters.com/article/uk-health-coronavirus-vaccines-pfizer-br/uk-expects-to-get-10-million-doses-of-pfizer-biontech-vaccine-this-year-idUKKBN27P1OT
54 https://www.bbc.co.uk/news/world-asia-india-55520658
scale of vaccinations centres), their capacity (e.g. hours of service), and ensuring they have a constant stream of prioritised patients. Centralising distribution exclusively through the NHS ultimately limits capacity. So, the Government should be looking to harness the full power of the private sector, army and volunteers. These opportunities are expanded upon below in Table 1.

Distribution should be completed as fast as possible while remaining safe. Current vaccination plans do not seem to be taking into account the risks of waiting areas being indoors, where COVID-19 spreads the fastest, even with mask wearing. Although mask wearing indoors does reduce the amount of aerosol transmission, it does not eliminate the risk entirely in unventilated spaces.55

Given the additional need to observe vaccine recipients for at least 15 minutes afterwards the obvious solution is to use outdoor spaces, especially if windows are not available to be opened and indoor spaces ventilated.56 There is significant evidence supporting the risk of aerosol transmission, and the WHO and CDC are clear that aerosol transmission is a major transmission route.57

It is inconsistent to close hospitality venues such as pubs because of the associated risk of spreading COVID-19 indoors, but fail to take into account the risks in waiting areas which will see hundreds of people a day.

Given the return on investment associated with accelerating vaccinations and our path out of the current crisis, this should be the top priority for the Government in 2021. While there are no doubt many experts from across Government (NHS, military logistics experts etc.) already involved in the vaccination programme, they lack the power to truly address supply chain issues, waive overly burdensome policies or fund new initiatives.

Number 10 should create a ‘War Room’ dedicated to accelerating the vaccination programme, empowered to remove bottlenecks and sources of waste across the end-to-end process. Where necessary, they should be able to gain funding and resources to launch new capabilities rapidly, as the Government did with other pandemic interventions like the furlough scheme. This could blend a gold–silver–bronze command structure, as used in other major operations by the emergency services (e.g. the Olympics), with a “platinum” level in national Government via the Cabinet Office Briefing Rooms (COBR). These groups, as well as other bodies supporting the vaccine rollout (e.g. Joint Committee on Vaccination and Immunisation (JCVI)) should meet very regularly until the campaign is on track to reach 6 million doses per week.

‘Red teams’ should be introduced to challenge plans and assumptions, reducing the risk of policy under delivery or failure, and identifying additional acceleration

57 https://science.sciencemag.org/content/370/6514/303.2
opportunities. In particular, the Government, the NHS and PHE should not be ashamed to call in for support from other countries, to understand their lessons learned and emulate different programme’s efficiencies and improvements.

Experts from the private sector with best-in-class logistics processes should also be used to review the end-to-end process, as well as conduct ‘dip-checks’ into vaccination centres for process improvement opportunities. Industry best practices inspired by the “Toyota Production System”, “Muda”, “Lean Six Sigma” and “Continuous Improvement” should be used to systematically remove sources of waste that delay vaccination roll out. Similarly, “Little’s Law” can be used to calculate and monitor lead times through a vaccination centre (the average time it takes from arrival to exit), and throughput (the rate of processing) to manage the efficiency of individual vaccination centres.

**Figure 4: The Eight Sources of Waste or “Muda” inspired by the Toyota Production System**

This is a popular framework to help operations leaders identify process improvement opportunities. In the context of accelerating vaccinations, note that some of these sources of waste would be deprioritised as a cost of maximising speed, in particular, overproduction or inventory. Exploring the other six sources of waste further should provide easy opportunities to speed up vaccination rollout.

The Government should also crowdsource ideas to accelerate the vaccination programme from those on the frontline, with substantial cash prizes awarded to those who identify new opportunities which are approved, implemented and effective. Small process issues at a vaccination centre level can cause huge delays, for example, excessive waiting between patients or over processing, doing more than is absolutely required, like excessive paperwork.

Raising the vaccination programme to the top of Government priorities, establishing a more empowered ‘War Room’ and command structure, and gathering robust feedback and process improvement will all contribute to a dynamic vaccination programme. However, there are already many opportunities to improve supply and distribution. The Government should explore these urgently, prioritising those
which are easiest to deliver and highest impact, namely boosting the number and scale of vaccination centres and other points of distribution. This should be done in collaboration with the Armed Forces, private sector and volunteers. Where feasible, vaccinations should now take place 24/7. Obstacles to extending venues and staffing should be minimised, and financial rewards should be provided to incentivise and compensate new vaccination capacity.

### Table 1: Potential vaccine supply and distribution acceleration opportunities

<table>
<thead>
<tr>
<th>Acceleration opportunity</th>
<th>Bottleneck addressed</th>
<th>Description &amp; considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Armed Forces and Reservists</td>
<td>Distribution - Vaccination centres &amp; overall logistics capabilities</td>
<td>Call on the Armed Forces to support the vaccination effort, using existing buildings or constructing field hospitals where necessary to expand the number of vaccination centres. Military logistical experts are already working with the NHS at a high planning level. But they should also be deployed at lower levels of distribution to increase efficiency of the distribution networks.</td>
</tr>
<tr>
<td>2. Pharmacies</td>
<td>Distribution - Vaccination centres &amp; skills</td>
<td>The centralised network of vaccine distribution allows the most vulnerable to get the vaccine first. However, pharmacies could extend vaccine centre capacity significantly (while being guided by the same Phase 1 priority groups). Government could allow pharmacies to purchase vaccines, and/or distribute them to pharmacies as extra vaccination centres. Pharmacies broke records last year when it came to flu jabs (distributing 1.7 million vaccines in two months) and are well placed to distribute COVID-19 vaccines.</td>
</tr>
<tr>
<td>3. Hospitality and other venues</td>
<td>Distribution - Vaccination centres</td>
<td>Some pubs and bars have already offered their venues as vaccination clinics (e.g. BrewDog). With most hospitality venues closed due to Government restrictions, they can be used to help remove the bottleneck on vaccination venues. They also benefit from commercial grade refrigeration (most of which will now be empty) which could be used to store the Oxford/AstraZeneca vaccine at the required 2-8 degrees celsius. Venues that are not typically used for vaccinations could be overseen by local medical professionals serving as devolved management. To incentivise participation, the Government could compensate venues and/or provide opportunities for former/furloughed staff members (see “Jabs Army” and logistics volunteers below). Venues not commonly used for vaccinations may need to be granted immunity from lawsuits (except for cases of gross misconduct) as well as support for insuring their premises for this purpose.</td>
</tr>
<tr>
<td>4. Public venues</td>
<td>Distribution - Vaccination centres</td>
<td>Places of worship, public housing, community centres, sports stadiums, school gyms, etc., provide further venue capacity. Particularly while stadiums and schools are closed, their car parks/grounds/pitches (ideally) and halls (properly ventilated) offer clear opportunities to distribute vaccines. Venues not commonly used for vaccinations may need to be granted immunity from lawsuits (except for cases of gross misconduct) as well as support for insuring their premises for this purpose.</td>
</tr>
<tr>
<td>5. Drive-in centres</td>
<td>Distribution - Vaccination centres &amp; safe waiting areas</td>
<td>Following best practice from around the world is having someone else learn hard lessons for you. Israel’s drive-in centres reduce the problem of aerosol transmission risk within waiting rooms. Guidance on what constitutes a safe clinical area could be temporarily updated to make it clear this is an acceptable alternative.</td>
</tr>
</tbody>
</table>

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58 [https://www.telegraph.co.uk/news/2020/12/31/welcome-year-vaccine-could-possibly-go-wrong/](https://www.telegraph.co.uk/news/2020/12/31/welcome-year-vaccine-could-possibly-go-wrong/)


60 [https://twitter.com/BrewDogJames/status/1344584543341326338](https://twitter.com/BrewDogJames/status/1344584543341326338)
6. Mobile vaccine centres

| Distribution - Vaccination centres and hard to reach patients |
| Mobile vaccine centres - flu jabs have been in the past distributed by private companies which turn up to private sector organisations and vaccinate whole offices. Although offices are for the most part closed, the idea of mobile vaccine centres should be used to reach more isolated populations. At a small scale, this could entail converted food vans with sufficient refrigeration. |

7. 24/7 services

| Distribution - Vaccination centres & staffing |
| The vaccination programme should expand to 24/7, and funding should be made available to staff vaccination clinics with overtime payments and night shift subsidies. This will also reduce potential wastage when it comes to unused vaccines, not used due to missed appointments and clerical errors. |

8. Walk-in services for “spare” appointments/doses

| Distribution - Wasted appointments/doses |
| There will be unused doses for a variety of reasons. If there are spare doses at the end of a given period (day, week) and vaccination centres are not running 24/7 the Government should allow walk-in clinics, perhaps time limited beyond the 8.00am-8.00pm window of vaccination. This will reduce the risk of vaccinations expiring due to clerical or logistic errors. |

9. Extend criteria

| Distribution - Maximum appointments |
| The NHS is currently providing vaccines largely to the first two priority groups, which includes those aged over 80, care home residents and healthcare workers. While these groups should continue to be prioritised, as there are more vaccines on the way it will be necessary to drop this stringent criteria. Initially this could include offering vaccinations to all those aged over 55, and vulnerable younger individuals, followed by allowing any individual regardless of age. |

10. “Jabs Army” and logistics volunteers

| Distribution - Staffing |
| Hire furloughed staff providing additional income, and paying a premium above furlough. Hospitality staff who are unable to work due to Tier 3 and above lockdowns would be an obvious pool of workers. These volunteers could either be trained to administer vaccines and/or take on logistics roles. Building up this additional staffing capacity will take time, particularly if onboarding requirements are too onerous (see below). |

11. Volunteer vaccinator onboarding requirements

| Distribution - Staffing |
| Retired doctors and nurses have complained that there is too much bureaucracy when they have attempted to sign up to help the vaccination programme. Unless a medical professional has been struck off, they should be allowed to return to support the vaccination programme. Unnecessary requirements will cause delays, and in any event the rehired medical professionals will be working with current members of staff who are already aware of the requirements such as fire safety. |

12. Increase payments to GPs and local health professionals

| Distribution - Staffing and venue |
| GPs are currently paid £12.58 per dose to deliver vaccines, to allow for extra training, post-vaccine observation, and other associated costs. Nevertheless, the costs to GP remain substantial considering they must provide staff from their existing workforce. A simple way to encourage more focus and effort on vaccinations would be to substantially increase the payment per dose. This will ensure GPs put as much effort as possible into providing the all-important vaccinations. |

13. Online booking platforms

| Distribution - Appointment friction |
| Vaccination is currently booked mainly by GPs sending letters. The NHS should explore an online booking system(s), perhaps using “Commercial-off-the-shelf” solutions rather than trying to develop its own system. They could commission existing private sector operators with experience in booking systems to develop the system. |

https://www.bmj.com/content/371/bmj.m4354
14. Reward Attendance

If “no-shows” prove to become a problem and a bottleneck to meeting targets, rewards could be provided for attendance, paid either after both doses, or only after successfully completing a full 2-dose vaccination course. The configuration would depend on the volume of “no-shows” for appointments at each stage. For traditional vaccination centres this would likely be a cash reward/voucher, but for re-purposed hospitality venues could be a shared reward (e.g. a takeaway pint).

15. Online delivery of vaccines (home injection kits)

If distribution remains a bottleneck despite all other measures a more radical option to consider would be the use of home injection kits delivered online, for those willing and able to do so. Given the small risk associated with allergic reactions and the requirement to self-administer the vaccine, this initiative could be limited in scope, only to those of high COVID-19 risk, who have experience of self-injecting (e.g. diabetics) with a history of allergies, upon completion of a self-assessment form. The injection itself would then be supervised online over a video call, as well as patient wellbeing after the injection is completed. Supervisors would have patient details and a fast-track line to dispatch an ambulance in any rare cases of an adverse reaction.

16. Marketing

As with other critical phases of the pandemic, the Government should explore the full range of marketing opportunities to build up awareness and understanding of the vaccination programme, counter misinformation, and encourage a constant stream of fully booked appointments, so that supply of patients does not become the main bottleneck.

17. Prizes

Awards for the best employees and centres. Centres which consistently are vaccinating at higher rates should be financially rewarded, and exemplary service by individuals who are finding ways to vaccinate as many as possible should be recognised.

18. Crowdsourcing

There is a huge reservoir of talent and ideas in the country. Unfortunately, most of these people do not have time or ability to influence the Government, but online platforms could be utilised to crowdsource new ideas, locations and incentive systems to improve the rollout. A £5m prize fund could be established to compensate winning ideas that are successful. There should also be a system of reporting blockages and shortages, anonymously.


Further clarification of delivery schedules and negotiation of increasingly rapid supplies. If necessary, the Government should pay a higher per-dose supplement for accelerating the delivery schedule. Support could also be provided to unblock supply chain issues (e.g. around glass vials), with Government underwriting purchase commitments or making pre-payments if necessary.

20. Market commitments

There have been concerns throughout the pandemic that input materials are a bottleneck to manufacturing vaccines. The Government should support pharmaceutical suppliers in reviewing their supply chain, and potential sources of delay. Where necessary, Government should support the secondary markets, pre-committing to purchase input materials above market rate or otherwise incentivising a market response.

21. Moderna vaccine

Grant immediate approval of the Moderna vaccine for order and distribution (given its approval by the U.S. Food & Drug Administration, while UK processes complete)

22. Novavax vaccine

Proactive planning for and stockpiling of the Novavax vaccine (pending completion of its phase 3 clinical trials and UK approval processes)

These recommendations will enable the large gains in vaccination speed. In addition, the Government should be open minded about solutions, given the huge costs of the pandemic.
CONCLUSION AND RECOMMENDATIONS

The fastest and safest path out of the crisis caused by the COVID-19 pandemic is mass vaccination. The UK can and must accelerate its efforts.

While the Government target of one million doses per week would be a step in the right direction, three times higher than current levels, it doesn’t go far enough. This paper recommends targeting six million doses per week, and to go even higher once that target is reached.

The cost of the pandemic is so high that it justified a true “war effort”. Every week of delay could cost the Government as much £6bn, not to mention wider costs to society.

Reaching our target will be challenging but is possible by harnessing the full power of the private sector, armed forces and volunteers. This paper identifies a wider range of high priority opportunities, from using the pharmacy network who are experienced in administering flu jabs, to the use of drive-in centres, 24/7 services and accelerated acquisition of further vaccines.

This paper hopes to encourage the Government to be more ambitious in its vaccination campaign, have confidence in success and to take wide ranging action to deliver these goals. Ultimately, it intends to make a contribution in bringing the pandemic to an end.