

this week

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LEON NEAL/PA

Vaccines' success drives lockdown exit

The government has announced plans for a gradual lifting of the current covid-19 lockdown in England from next month, based on its assessment of the current evidence (see box, page 298).

In a speech to the House of Commons on 22 February the prime minister gave details of the road map for exiting lockdown in four stages, subject to four conditions being met at each stage. Boris Johnson said that although the threat "remains substantial," the "extraordinary success" of the vaccine programme led by the NHS, alongside falling infections and hospital admissions, meant that a planned cautious lifting of restrictions was now possible.

"This road map should be cautious but irreversible," Johnson said. "This journey is made possible because of the pace of the vaccination programme."

From 8 March all schools in England will reopen, with outdoor after-school sports and activities allowed, while two people will be allowed to meet for recreation such as a coffee or picnic in public spaces. From 29 March outdoor gatherings of six people (or two households) will be permitted, including in private gardens, and outdoor sports

facilities, such as tennis and basketball courts, will be allowed to reopen. In the second stage from 12 April non essential retail, most outdoor attractions, and leisure facilities will reopen.

The third stage, which will occur no earlier than 17 May, could see groups of 30 permitted outdoors, six people or two households allowed to meet indoors, and the return of international travel.

The final stage, no earlier than 21 June, would see no legal limits on social contact.

Johnson told MPs that the restrictions would be lifted only if four conditions were met at each stage:

- The covid-19 vaccine deployment programme continues successfully
- Evidence shows vaccines are sufficiently reducing numbers of deaths and hospital admissions
- Infection rates do not risk a surge in hospital admissions, and
- The government's assessment of the risks is not fundamentally changed by new variants.

Johnson said, "At every stage our decisions will be led by data not dates."

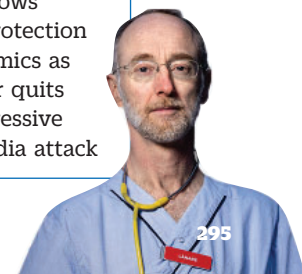
The devolved administrations in Scotland, Wales, and Northern Ireland

(Continued on page 298)

Boris Johnson, the prime minister, said every stage of the process will be "led by data not dates"

LATEST ONLINE

- Covid-19 will become endemic but with decreased potency over time, scientists believe
- Ethnicity vaccination gap narrows in England, but concerns remain
- Sweden vows greater protection for academics as researcher quits after aggressive social media attack



SEVEN DAYS IN

Recognise long covid as occupational disease and compensate workers, say MPs



MPs have stepped up pressure on ministers to recognise long covid as an occupational disease and to compensate frontline health and other key workers living with it.

The proposal by the All Party Parliamentary Group on Coronavirus has won the backing of 65 MPs and peers, as well as the BMA. Layla Moran, a Liberal Democrat MP who chairs the group, said that “heroes of the pandemic” who contracted covid while serving the public should be eligible for regular monthly compensation payments. “These are the people who saved our lives and it’s only right we save their livelihoods,” she told the BBC’s *Today* programme on 18 February.

About one in 10 people with covid continues to experience symptoms beyond 12 weeks, including breathlessness, headaches, cough, fatigue, and cognitive impairment.

The MPs, in a letter to the prime minister, described long covid as the “hidden health crisis of the pandemic” and estimated that 390 000 people were living with its debilitating effects. The group said MPs had heard evidence from many frontline health and other key workers who felt “abandoned.”

Matthew Limb, London [Cite this as: BMJ 2021;372:n503](#)

Covid-19

BMA repeats plea for PPE guidance review

A coalition of more than 20 organisations wrote to the UK prime minister, Boris Johnson, to reiterate their call for a review of the current infection prevention and control guidance, which they said “does not accurately depict the airborne risks when sharing health and care settings including working in patients’ homes and public buildings.” The BMA, the Royal College of Nursing, and others also called for better ventilation in all at risk settings and for data to be collected and published on healthcare workers who have contracted the virus at work, to help identify settings where staff are most affected.

Care homes in England will allow named visitors

Care home residents in England will be able to be visited indoors by a single named individual from 8 March as part of the prime minister’s “road map” to ease lockdown restrictions. Visitors will be allowed repeated contact with the resident but will have to undergo a lateral flow test for covid-19 beforehand, wear PPE during the visit, and avoid close contact. Close contact care will be restricted to visitors who

provide assistance such as help with dressing, eating, or washing. These carers will continue to have regular PCR tests and observe the same PPE arrangements as staff.

Scotland “failed to learn” from pre-pandemic drill

The health service in Scotland should have been better prepared to respond to some of the challenges posed by the covid-19 pandemic, said the country’s auditor general. The review of 2020 praised early action taken in the first wave of the pandemic to prevent hospitals from being overwhelmed, but it criticised the failure to implement measures identified in three pre-pandemic planning exercises. This left patient-facing staff unprotected and resulted in 39% of all covid-19 deaths in Scotland taking place in care homes.

Primary care US subsidiary to run more than 50 English practices

Operose Health—a subsidiary of the US company Centene—acquired AT Medics, which operates 37 general practices in London, mostly under Alternative Provider Medical Services contracts. These will add to the 21 general

practices in England Operose acquired last year. The expansion will make Operose one of the largest primary care providers in England, providing care to more than 500 000 patients. Jackie Applebee (below), chair of Doctors in Unite and a GP, said the move was evidence that the NHS was being privatised.

Respiratory services Workforce is in “state of constant crisis”

The British Thoracic Society (right) has warned that respiratory services are so understaffed and under-resourced they cannot deliver routine services and specialist clinics while treating patients with acute covid-19 and running long covid clinics. While it said an increase in the respiratory workforce was ultimately needed, it set out proposals to allow the NHS to make the best use of the existing workforce, such as annual staff scheduling to reflect seasonal demand and service agreements limiting the amount of time spent providing general and emergency medicine care.



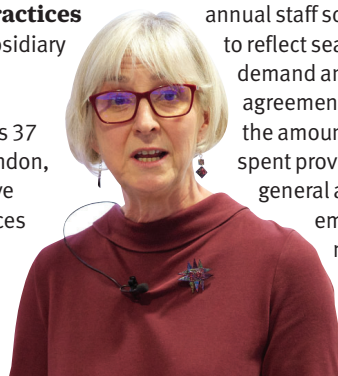
Every hospital “needs respiratory support unit”

Doctors from the BTS called for the NHS to officially recognise, roll out, and fund respiratory support units throughout the UK. Arrangements resembling respiratory support units have emerged during the pandemic to care for patients outside critical care units, and they are increasingly recognised as a way to deliver enhanced respiratory support to people with severe lung disease. Doctors believe the units could transform care and be particularly useful in coping with winter pressures and the ongoing presence of endemic covid-19.

Science

New agency backs high risk research

The government put £800m into a new, independent scientific research agency to help fund “high risk research that offers the chance of high rewards.” The Advanced Research & Invention Agency will be based on models that have proved successful in other countries, particularly the influential US Advanced Research Projects Agency model, which was a vital pre-pandemic funder of mRNA vaccines.



MEDICINE

Prescribing

GMC updates guidance on remote prescribing

The GMC updated its guidance on standards for good practice when prescribing remotely and face to face, when prescribing unlicensed medicines, and when patient care is shared with another doctor. It makes clear that the same standards remain when prescribing remotely as when seeing patients, such as being satisfied that an adequate assessment has been made, establishing a dialogue, and obtaining consent. New advice says that doctors should not prescribe controlled drugs unless they have access to patient records, except in emergencies.

Vaccines

A 12 week interval "works better than six"

A three month interval between doses of the Oxford-AstraZeneca vaccine results in higher efficacy (81%) than only a six week interval (55%), and the first dose offers 76% protection from 22 days onwards, showed the results of post hoc exploratory analyses



from a phase III randomised controlled trial published in the *Lancet*. The study, which was published as a preprint at the start of February, also confirmed efficacy against symptomatic disease after two doses, with no hospital admissions or deaths among the people vaccinated (8597 participants), compared with 15 instances in the control group (8581).



One Pfizer dose "is 85% effective after 15 days"

Early findings from the campaign to vaccinate healthcare workers against SARS-CoV-2 in Israel suggested that the Pfizer-BioNTech vaccine reduced symptomatic infections by 47% between days 1 and 14 post-vaccination, rising to an 85% reduction between days 15 and 28. The figures from Sheba Medical Centre were published in the *Lancet* and covered 9000 healthcare workers from 19 December 2020 to 24 January 2021. Confirmed covid-19 cases totalled 170 during that period, of which 89 (52%) were in unvaccinated staff, 78 (46%) in people who had been given one dose, and three (2%) in people who had had two doses.

Flu vaccination

Lansley reforms caused fall in London's uptake

The centralisation of vaccine coordination that stemmed from the Health and Social Care Act 2012 led by Andrew Lansley disproportionately affected London, said a report from the Royal Society for Public Health. This led to just one person being accountable for flu vaccination across the whole of London, covering 2.2 million eligible patients and 2186 general practices. The gap between overall flu vaccination rates around England and in London grew from 1.8% to 6.2% between 2011 and 2019-20.

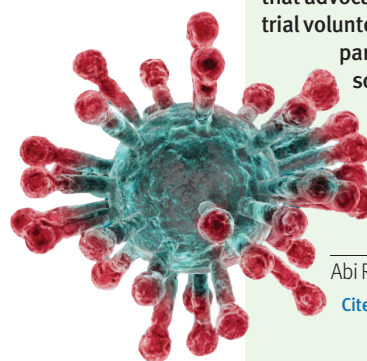
Cite this as: *BMJ* 2021;372:n517

COVID-19

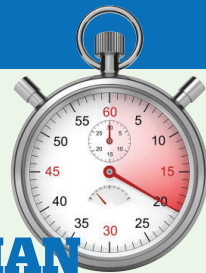
Covid-19 infection in pregnancy was not associated with stillbirth or early neonatal death, but it did increase the risk of preterm delivery

from 7.5% to 12% among 1606 women from the UK

[*Ultrasound in Obstetrics and Gynecology*]



SIXTY SECONDS ON... HUMAN CHALLENGE TRIALS



NOT ANOTHER REALITY TV SHOW?

Thankfully, no. I'm referring to trials in which healthy volunteers are exposed to a pathogen to learn more about the disease it causes and to test vaccines quickly.

SO, THIS IS ABOUT COVID-19?

Isn't everything? This is the world's first covid human challenge trial that the UK announced will begin within a month.

HOW WILL IT WORK?

Up to 90 healthy volunteers aged 18 to 30 will be exposed to covid-19 in a "safe and controlled environment" at the Royal Free Hospital in London.

HOW WILL THEY BE INFECTED?

Don't worry, this isn't an excuse for a party. The virus being used has been produced at Great Ormond Street Hospital, London, in collaboration with the company HIVIO.

WILL VOLUNTEERS BECOME UNWELL?

Stephen Griffin, associate professor at Leeds School of Medicine, says volunteers will be given remdesivir as soon as infection is confirmed. He says it's unlikely participants will become very ill, but noted that even mild infection could cause long term morbidity.

IT HAD BETTER BE WORTH IT

The aim is to help doctors understand how the immune system reacts to coronavirus and identify factors that influence how it is transmitted.

SO THIS ISN'T ABOUT VACCINES?

Not yet. But, after this first stage of the trial, vaccine candidates that have proved to be safe could be given to a few volunteers to identify the most effective ones and accelerate their development.

IS THIS ETHICAL?

An independent research ethics committee approved the study. Previously, authors from 1Day Sooner—a non-profit organisation that advocates for covid human challenge trial volunteers—cited the principle of "risk parity" in a *BMJ* article. "If we allow some people to take certain risks to help save lives then we should allow other people to take similar, voluntary risks when there are comparable benefits," they said.

Abi Rimmer, *The BMJ*

Cite this as: *BMJ* 2021;372:n515

(Continued from page 295)

will set out their own plans for easing lockdown.

In recognition of the speed at which vaccines are being delivered the government has also moved forward its target for offering every adult a first dose to the end of July.

In a joint statement the president of the Royal College of Anaesthetists, Ravi Mahajan, and the dean of the Faculty of Intensive Care Medicine, Alison Pittard, welcomed the commitment to maintaining a cautious approach.

“With hospital admissions still high and the latest reported average daily number of covid related deaths currently at 447, any changes to restrictions based on dates not data would be irresponsible at best and at worst risk thousands more lives and extend the ongoing financial hardships for millions,” they said.

Gareth Iacobucci, Elisabeth Mahase, *The BMJ*
Cite this as: *BMJ* 2021;372:n528

THE EVIDENCE

Siren study

The Pfizer/BioNTech covid-19 vaccine is at least **70%** effective against infection 21 days after the first dose and at least **85%** seven days after the second dose, shows a UK study of healthcare workers. The study previously investigated the effect of prior infection on protection against reinfection but has been amended to investigate vaccine effectiveness. The first results have looked at the eight weeks after the first vaccine dose.

The Public Health England report said there were 977 new infections during 710587 person days in the unvaccinated group, equating to an incidence density of 14 infections per 10 000 person days of follow-up. In comparison, there were 71 new infections 21 days after the first dose and nine cases seven days after the second dose in the vaccinated group. This equated to an incidence density of 8 per 10 000 and 4 per 10 000 person days of follow-up, respectively.

PHE surveillance report

This report, linking vaccinations with hospital admissions, said one dose of the Pfizer vaccine seems to be at least **57%** effective in people aged over 80, 28 days after vaccination. This rose to **88%** seven days after the second dose. Observations also indicate a “higher level of protection (probably above **75%**) against severe disease from a single dose of Pfizer vaccine in the over 80s.” It is too early for Oxford/AstraZeneca results.

GPs opt to prioritise patients with learning disabilities



YUI WOK/PA

Local groups of GPs have decided to prioritise all patients with learning disabilities for covid-19 vaccination, after fresh evidence showed that disabled patients were at much higher risk from the disease.

Figures from the Office for National Statistics showed that 60% of people in England who died from covid-19 from January to November 2020 (30 296 of 50 888) had a disability.

Last week an extra 1.7 million people in England—including some with severe learning disabilities—were being added to the list of people identified as clinically extremely vulnerable to covid-19, although this does not include people with mild or moderate learning disabilities. But some clinical commissioning groups (CCGs) have

deviated from national guidance and said that they will prioritise all patients with learning disabilities for vaccination given the disproportionate impact on them.

In a statement published on its website Kent and Medway CCG said, “Given the evidence of covid-19 inequalities increasing deaths amongst people with learning disabilities, the NHS in Kent and Medway has agreed to prioritise vaccinating the 9500 people on GP learning disability registers.”

Lower life expectancy

Oxfordshire CCG was also praised by campaigners for adjusting its priority list so that everybody with a learning disability is included in priority group 6, regardless of its severity.

Data showed that the risk of death

No evidence at all that vaccines can affect fertility, says new guidance

There is “absolutely no evidence” that covid-19 vaccines can affect the fertility of women or men, says new expert guidance.

The guidance, published by the Association of Reproductive and Clinical Scientists and the British Fertility Society, comes amid concerns that misinformation that has been circulating online may be putting some women off having the vaccine.

Kamlesh Khunti, professor of primary care diabetes and vascular medicine at Leicester, told *The BMJ* he was concerned that misinformation may have contributed to the lower uptake among doctors in a study he led of vaccination rates in staff at Leicester hospital, which published preliminary findings this week.

“We’ve seen a lot of blatant misinformation

that the vaccine may have an effect on fertility for younger women—that’s coming through regularly on social media,” he said.

The guidance says, “There is absolutely no evidence, and no theoretical reason, that any of the vaccines can affect the fertility of women or men.” People of reproductive age should get a vaccine when they receive their invitation, including people who

involving covid-19 was at least 3.1 times greater in people who were more disabled and about two times greater in those who were less disabled.

Helen Salisbury, an Oxford GP and *BMJ* columnist, said that she would “wholeheartedly support” adding all patients with learning disabilities to the priority list given the increased risk that they faced.

“It makes total sense, and I’m fully behind Oxford doing it,” she said. “The Green Book refers to those with severe and profound learning disabilities [as being in the age 16-65 at risk group]. But one of the features of learning disabilities is being less able to follow all the rules and keep yourself safe, which puts you at increased risk of catching covid.”

Joe McManners, a GP in Oxford and clinical director of a local primary care network, also backed the move. “It is a very specific group who have lower life expectancy and a much higher risk of serious illness, so it’s the right decision,” he told *The BMJ*.

Edel Harris, chief executive of the learning disability charity Mencap, called for everyone in England with a learning disability in group 6 to have priority for vaccination.

Gareth Iacobucci, *The BMJ*
Cite this as: *BMJ* 2021;372:n510

FIGURES from the Office for National Statistics showed that **60%** of people in England who died from covid-19 had a disability



are trying to have a baby or thinking about having a baby in the future, it adds.

People undergoing fertility treatment can be vaccinated during treatment, but may wish to consider the timing given the potential side effects. “It may be sensible to separate the date of vaccination by a few days from some

treatment procedures so that any symptoms, such as fever, might be attributed correctly to the vaccine or the treatment procedure,” says the guidance.

People may start fertility treatment immediately after being vaccinated, unless they wish to have a second dose before pregnancy, it adds.

Pregnant women in a covid risk category can have the vaccine, but those who are not should delay the vaccine until after pregnancy, the guidance advises.

Gareth Iacobucci, *The BMJ*
Cite this as: *BMJ* 2021;372:n509



Everyone with a learning disability should be a priority for vaccination
Edel Harris



Hancock’s failure to publish contracts was unlawful

The government acted unlawfully in failing to publish details of dozens of contracts awarded without competition for goods and services such as personal protective equipment needed during the pandemic, a High Court judge has ruled.

Mr Justice Chamberlain upheld a challenge by the non-profit Good Law Project (below) to the failure by Matt Hancock (below right), health and social care secretary for England, to publish notices for a “substantial” number of the deals, as required by law.

Regulations on public contracts allow deals to be entered into without tender for reasons of extreme urgency. But regulation 50 specifies that a contract award notice (CAN) must be published no later than 30 days later.

VIP lane

The Good Law Project is mounting separate legal challenges over some of the contracts given to individuals and companies with links to ministers or officials through a so called VIP lane. Given the large number of contracts concluded without competition, it argued the public would have no way of knowing that a contract existed without the publication of a CAN.

The obligations imposed by regulation 50 and the transparency policy “serve a vital public function and that function was no less important during a pandemic,” Chamberlain said. “The secretary of state spent vast quantities of public money on pandemic related procurements during 2020. The public were entitled to see who this money was going to, what it was being

spent on, and how the relevant contracts were awarded.”

Oversight bodies

This was important, he said, not only so competitors could understand whether the obligations owed them under the regulations had been breached, but so that oversight bodies such as the National Audit Office, as well as parliament and the public, “could scrutinise and ask questions about this expenditure.” He criticised the government for persisting in defending the claim and insisting that it was guilty of only “technical” breaches.

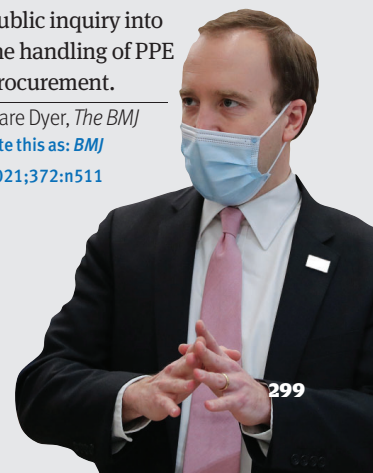
“On receipt of the letter before claim, the sensible course would have been candidly to admit, as the documents now disclosed indicate must have been apparent, that in a substantial number of cases the secretary of state had breached regulation 50, to explain why this had happened, and to undertake to publish the outstanding CANs within a reasonable period,” he said.

“If that had been done, this litigation, which by the time of the hearing had cost the secretary of state alone some £207 000, might not have been necessary.”

Following the judgment, the Good Law Project wrote to Hancock urging him to publish outstanding contracts and the names of companies that went through the VIP lane. The letter called on him to commit to recovering money from all those who failed to deliver compliant product and to undertake a public inquiry into the handling of PPE procurement.

Clare Dyer, *The BMJ*
Cite this as: *BMJ* 2021;372:n511

The public were entitled to see who this money was going to
Mr Justice Chamberlain



Is the UK's vaccination programme reducing case and death numbers?

As fatalities among the over 80s seem to be falling faster than other age groups, are we starting to see the effect of the rollout? **Jacqui Wise** looks at what we know

? Are deaths falling in groups of people who have been vaccinated?

The number of deaths in the UK within 28 days of a positive covid-19 test has been steadily falling since mid-January. An analysis carried out by the *Guardian*, using data from the official government dashboard, shows that from 24 January to 12 February deaths from coronavirus in England among those over 80 fell by 62%. This compares with a drop of 47% among people aged between 20 and 64 and 51% among those aged 65 to 79.

In Scotland deaths involving covid-19 have been falling in all locations, with the fastest decrease in care homes. In the three weeks to 14 February deaths in care homes fell by 62% to a level last seen around the end of October. Older residents in care homes were treated as the top priority when the vaccination programme began. The report from the National Records of Scotland shows that the number of deaths in the 85 or over age group has fallen by 45%—more steeply than younger age groups. There are now fewer deaths in this age group than in the 75-84 age group for the first time since mid-November.

? Is this because of the vaccination programme?

By 10 January more than a third (34.6%) of people aged 80 or over in England had received at least one dose of a covid-19 vaccine, said Public Health England. In comparison, less than 3% of under-80s in England had received a first dose by this stage. It takes two to three weeks for immunity to build after vaccination and then a further two to three weeks between a coronavirus infection and death from the virus, so data from mid-February would provide the first indication that the vaccination programme was starting to have an effect.

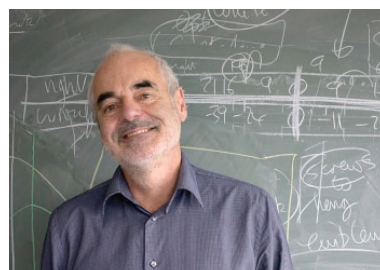
David Spiegelhalter, chair of the Winton Centre for Risk and Evidence Communication at Cambridge University, told *The BMJ* that the signs were encouraging. "We can see that deaths in the over 85s are going down faster than in younger groups over the past couple of weeks. We can't definitively say that this is because of the vaccination programme but it is compatible with the start of an effect of vaccines." He explained that, because deaths were going down so fast in every age group, spotting that one group was seeing a faster decrease than another was a challenge.

However, Sheila Bird, formerly programme leader at the MRC Biostatistics Unit in Cambridge, told *The BMJ* she was not yet persuaded that deaths were falling more rapidly in the over 80s. "I would like to see a detailed analysis that considers people's vaccine status." She pointed out that there are often delays in registering deaths.

Scotland's first minister, Nicola Sturgeon, said the latest Scottish data contained the "first hard evidence of the positive impact of vaccination." But Chris Whitty, the UK's chief medical adviser, said that he would "expect to see some evidence that is strong enough to put into the public domain in the next few weeks."

? Is vaccination having an effect on hospital admissions?

Admissions to hospital are falling in



David Spiegelhalter: "Encouraging signs"

all age groups, presumably the effect of the current lockdown, and they are falling faster in the 75-84 year olds than in other adult age groups. Duncan Robertson, an analyst at Loughborough University's School of Business and Economics, told *The BMJ*, "This may be the first tentative sign of a vaccination effect, although we will need more data to be confident that this is an actual trend."

Spiegelhalter, who has carried out his own analysis of the data, said that in the 10 days up to 14 February hospital admissions were falling at 27% each week in the over 85s and 20% a week in the under 65s.

Figures from Scotland, available as a preprint, showed that four weeks after the first doses of the Pfizer/BioNTech and Oxford/AstraZeneca vaccines were administered the risk of hospitalisation from covid-19 fell by up to 85% (95% confidence interval 76 to 91) and 94% (95% CI 73 to 99), respectively.

? Are infection rates falling among older people?

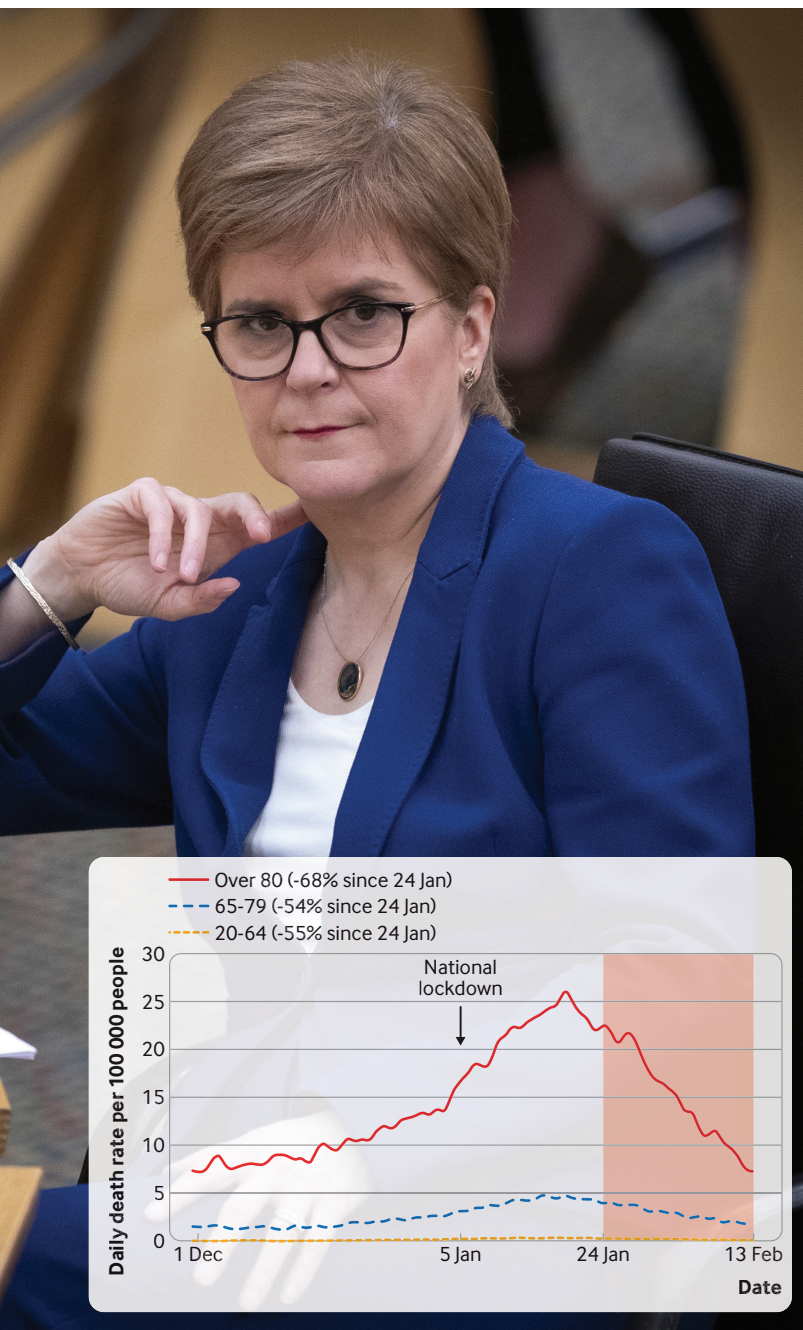
Case numbers might not be a reliable indicator of vaccine effectiveness. The large number of routine coronavirus tests in settings such as care homes will also pick up mild and asymptomatic infections. The latest phase of the Real-time Assessment of Community Transmission study found that covid-19 infections fell by two thirds from mid-January to mid-February.

However, the fall in prevalence in people aged 65 years or over was similar to that in other age groups. The study authors, from Imperial College London, said this indicated that if vaccines were effective at reducing transmission, as well as disease, this effect was not yet a major driver of prevalence trends.

This is first hard evidence of the positive impact of vaccination

Nicola Sturgeon

JANE BARLOW/PA



Therefore, the observed falls described here are most likely because of reduced social interaction during lockdown.

? What can we say for sure?

Experts agree that though the signs are encouraging better data are needed. Robertson said, “The vaccination rollout data are limited, despite the Royal Statistical Society and the Office for Statistics Regulation calling for more detailed statistics such as take-up by priority group and which vaccine was administered, split by ethnicity, location, and age.”

Bird added that we need to see data on death rates linked by vaccine type and whether a patient had a second dose. The picture should become clearer in the next few weeks.

Jacqui Wise, London

Cite this as: *BMJ* 2021;372:n506

There was a drop of **47%** among people aged between 20 and 64 and **51%** among those aged 65 to 79

In Scotland deaths involving covid-19 have been falling in all locations. In the three weeks to 14 February deaths in care homes fell by **62%** to a level last seen around the end of October

Plan to share vaccines is not enough, says charity

Pledges by leaders of the G7 group of richest countries to increase cooperation on covid and commit \$7.5bn (£5.3bn) to sharing vaccine supply around the world are insufficient, Oxfam has said.

The charity said steps to increase vaccine supply to poorer countries, though welcome, would not be enough to deal with the threat and to redress “immoral” inequalities of access.

Meanwhile, the UK is being urged to act more quickly on its commitment to make “surplus” vaccines available to developing countries and to explain when it would have spare doses.

Covax pledges

In a virtual summit meeting hosted by Boris Johnson on 19 February (below), the leaders of the G7 countries (UK, US, Canada, Japan, Germany, France, and Italy, plus the EU) pledged funding for the Covax scheme, which aims to get at least 1.3 billion doses of vaccine to 92 low and middle income states by December.

The G7 statement said, “We reaffirm our support for all pillars of the Access to COVID-19 Tools Accelerator (ACT-A), its COVAX facility, and affordable and equitable access to vaccines, therapeutics and diagnostics, reflecting the role of extensive immunisation as a global public good.”

President Joe Biden pledged up to \$4bn in US support. The EU announced it was doubling its contribution to €1bn, Germany pledged a further €900m, and the UK is allocating £548m.

But there remains criticism that distribution of vaccines is uneven and unfair. Ten countries have administered 75% of all vaccinations worldwide, while 130 countries had yet to receive a single dose, said the UN.

Max Lawson, Oxfam’s head of inequality policy, said, “Between them, G7 nations have secured enough vaccines for every one of their citizens to be vaccinated three times over, while many poor countries are yet to receive a single dose.” He said the latest pledge represented only limited progress and large parts of Africa and Asia would still be left waiting for leftover vaccines to “trickle down to them,” which was “immoral” and posed a risk to global health.

“The longer huge swathes of the world’s population are denied protection, the greater the threat that virus mutations will threaten us all,” Lawson said.

Johnson told the summit the UK, which has ordered around 450 million doses, would donate most of its “surplus” vaccine supply to poorer countries. This was dependent on reliable supply chains and whether new vaccines were needed for variant strains or as a booster in the autumn, the UK government said.

The BMA, welcoming the gesture of “solidarity”, called for more detail. “The government must now be transparent over what the UK’s commitment will be and how this will be achieved,” said David Wrigley, deputy chair of council.

Matthew Limb, London Cite this as: *BMJ* 2021;372:n516



TEN countries have administered **75%** of all vaccinations; 130 have not received one dose



THE BIG PICTURE

Sambadrome marks Brazil's covid deaths

For decades the Marquês de Sapucaí Sambadrome has been the home of Rio de Janeiro's *Carnaval* celebrations with up to 90 000 specators paying to watch the parades.

This year, with the pandemic forcing the cancellation of carnival, the site became a blaze

of colour to commemorate the more than 241 000 people who have died in Brazil of covid-19—the second highest total in the world behind the US. The country has recorded almost 10 million cases.

Alison Shepherd, *The BMJ*

Cite this as: *BMJ* 2021;372:n518



BUDA MENDES/GETTY IMAGES

Poverty, health, and covid-19

Yet again, poor families will be hardest hit by the pandemic's long economic fallout

Covid-19 does not strike at random—mortality is much higher in elderly people, poorer groups, and ethnic minorities, and its economic effect is also unevenly distributed across the population. The economic fallout is likely to be felt for years. Without concerted preventive action worse off families and communities will be disproportionately affected, increasing health inequalities in the UK and globally.

People in precarious, low paid, manual jobs in the caring, retail, and service sectors have been more exposed to covid-19 as their face-to-face jobs cannot be done from home.³ Overcrowded, poor quality housing in densely populated areas has often added to their increased risk.⁴ Increased rates of infection and severity of covid-19 have led to greater loss of income linked to disruptions to work and job loss, but the immediate financial pressure of covid-19 has gone far beyond this.

Containment and lockdown measures have disproportionately affected low income families with young children.⁵ Recent research identified the extra costs involved in having children at home for longer requiring increased spending on food, heating, and occupying children indoors. Over a third of low income families with children increased their spending during 2020, while 40% of high income families without children reduced theirs.⁶

Rising demand for universal credit exposed the inadequacy of current levels of benefits. The UK government increased universal credit payments by £20 (€23; \$28) a week to compensate for extra expenses during lockdown, but as yet the increase is only temporary. Food poverty increased, with free school meals having to be replaced by emergency measures. Government support for



By far the most devastating long term costs of the pandemic are likely to fall on today's children

this scheme has been precarious, and at times the measures have been inadequate to maintain the health of growing children.⁷

Long term forecast

Predicted long term economic effects include loss of future earnings and unemployment, pushing more adults, particularly parents, into poverty. The effect of the pandemic on employment is predicted to be 10 times greater than that of the 2008 financial crisis,⁸ which led to a sharp increase in suicides and mental illness.⁹

By far the most devastating long term costs of the pandemic are likely to fall on today's children as they grow, develop, and forge their own economic futures.^{2,5} Child poverty is already the biggest threat to child health and development in the UK and globally,¹⁰ so the predicted increase is concerning.¹¹ A combination of worse financial strain within families and stay-at-home pandemic policies is causing immediate harm to the development and mental health of children, with some younger children regressing in basic skills.¹² Currently, one in six children and young people

have mental health problems¹³ as their lives are “put on hold,” with clear implications for their long term health and earnings.

Lost learning will cause the greatest damage to the qualifications and job prospects of pupils who are already disadvantaged. Calling for a “massive national policy response,”¹⁴ the Institute for Fiscal Studies estimated that missing half a year of school could mean losing £40 000 in lifetime earnings, with negative effects concentrated among children from disadvantaged backgrounds.

The common framing of action as a trade-off between protecting health or protecting the economy is a false dichotomy: international evidence shows that the virus must be under control for the economy to recover.¹⁵ We need to protect the worse off in society from the adverse consequences falling disproportionately on them, especially by giving every child the best start in life. This could include, in the immediate future, retaining the universal credit uplift, raising the pupil premium, and introducing intensive measures to help disadvantaged pupils catch up on lost learning, including addressing the digital divide.

In the medium term, the large numbers of people out of work and those whose ability to work is reduced because of the long term effects of covid-19 will need effective support and training to return to work. Reinvesting in children's preventive services such as Sure Start children's centres and improved access to a range of mental health services will be crucial. But above all we must avoid reintroducing austerity measures to fix the economy, which would again fall heaviest on the most disadvantaged groups and communities, widening health inequalities still further. Instead, we must “build back fairer.”¹⁶

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NHS reforms: politicians take back control

England's pandemic experience supports collaboration, not centralisation

Given its strapline—“Integration and Innovation”—it is no surprise that the Department of Health and Social Care's new white paper aims to promote the longstanding integration agenda while downgrading competition as the organising principle for the NHS.¹ Many have also noted that the proposals decisively tilt the balance of power back to the department and away from NHS England.^{2,3} The white paper contains a broad range of proposals and looking across the full set, the shift of power towards ministers and the department is a recurring theme.

NHS England is the most obvious loser in this general rearrangement. Since 2012, ministers have been able to formally instruct NHS England only once a year, in the NHS mandate, using a rather laborious process. The new proposals would give ministers greater power to direct NHS England on both NHS policy and the public health duties carried out by the NHS, such as vaccinations and screening. Although the white paper pledges to protect the day-to-day clinical and operational independence of the NHS, defining when ministers can and cannot intervene may prove challenging.

Power to intervene

Under the proposals, ministers would not be able to direct local NHS organisations such as trusts, but they would have the power to intervene more freely in service reconfigurations and to stop capital spending by trusts if their spending risked breaching the Treasury's financial controls. These measures are not limited to the NHS; the department also intends to take the power to fund social care providers directly instead of routing money through local government, although this is intended for exceptional



These proposals place politicians emphatically at the top of the NHS and healthcare hierarchy

circumstances and is not designed to replace the current system.

The proposals give ministers the power to rearrange the functions of all the various national bodies set up by government to oversee health and care. NHS England is a high profile example, but others include Health Education England and NHS Digital. Ministers would even have the power to shut down these organisations, although the white paper says there are no current plans to use it. The National Institute for Health and Care Excellence is the only arm's length body specifically excluded, although more are likely to be added to the list.

Professional regulators get similar treatment. Ministers want the power to remove professions from regulation and to introduce professional regulation for senior NHS managers and leaders. They also want greater freedoms to abolish regulators (they already have the power to create them), particularly relevant if government intends to merge existing regulators. Regulators will also be able to delegate functions, allowing one regulator to run an entire function, such as registration, for others.

Taken together, these proposals make quite a shopping list and place politicians emphatically at the top of the NHS and healthcare hierarchy.

The covid-19 pandemic has improved cooperation within the NHS as well as between the NHS and other partners such as local government and the voluntary sector. That experience supports the legislative move towards integration but provides much less obvious support for moves to strengthen ministerial control. The areas of greatest controversy during the first wave, including procurement of personal protective equipment, testing, and the system for contact tracing (“test and trace”), were all led by the health department.

Two explanations

There are two possible explanations for this shift of power back to ministers. The first recognises that NHS England was given greater independence in 2012, when oversight was shared with other national bodies, including Monitor and the NHS Trust Development Authority—later rebranded as NHS Improvement and to be merged into NHS England. Equally important, the invisible hand of the market was meant to guide the system.

In 2021, an unelected NHS England is all that's left to oversee an NHS that most observers now agree is a managed system, not a market. The 2012 reforms did not envisage a giant NHS England surrounded by an array of much smaller satellites, including the health department, Public Health England's replacement (yet to be defined), Health Education England, and the Care Quality Commission.

The other explanation (and they are not mutually exclusive) is that the 2012 reforms were simply an aberration, following as they did more than 60 years of more direct ministerial control. The post-pandemic “new normal” for the NHS's relationship with politicians might look surprisingly like the “old normal” that prevailed for the majority of its history.

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INVESTIGATION

Tracking down John Bell: exposing a transparency crisis

As testing and the Oxford AstraZeneca vaccine are hailed as UK pandemic successes, why won't Oxford University or the government disclose the "long list" of financial interests of a high profile researcher at the centre of both? **Paul D Thacker** investigates



Since the covid-19 outbreak began early last year, John Bell, regius professor of medicine at Oxford University, has held high profile roles in the UK government's epidemic response while also working with AstraZeneca on the vaccine.

But both Oxford and the government have refused to disclose Bell's financial interests after *The BMJ* filed freedom of information (FOI) requests. More alarmingly, it appears that the government is referring media enquiries about Bell through the Cabinet Office and is scrutinising a reporter for *The BMJ* as it has other reporters it finds troublesome. *The BMJ* has been unable to gain either direct contact with Bell or contact through his employer, Oxford University, despite multiple attempts.

The Daily Mail reported on Bell's financial ties in September 2020, noting that he had £773 000 worth of shares in the pharmaceutical company Roche. The newspaper published the story after Roche sold the government £13.5m of antibody tests, which Public Health England later found to be unreliable.

Bell had headed the National Covid Testing Scientific Advisory Panel and chaired the government's test approvals group, but he told the *Mail* that he had no role in the purchase and that he had disclosed to the government "a long list of my

interests." The government and Oxford University's failure to be open about Bell's financial ties make it impossible for the public to know what, if any, interests the professor has when influencing key decisions about which of the many covid-19 tests the UK should purchase.

Last November, *The BMJ* emailed both Oxford University and the Department for Business, Energy, and Industrial Strategy (BEIS) requesting proof that Bell had disclosed his "long list" of financial interests, and asked for copies of any forms. BEIS runs the Vaccine Taskforce, which named Bell and AstraZeneca as members. A BEIS spokesperson then contradicted their own press release, telling *The BMJ* that Bell was a member of the "expert advisory group to the Vaccine Taskforce, rather than a member of the taskforce itself." Both BEIS and Oxford University subsequently refused to disclose forms Bell allegedly filled out detailing his financial conflicts.

After these refusals, *The BMJ* filed FOI requests with both Oxford and BEIS, asking for copies of Bell's forms. We also requested that BEIS disclose forms signed by other Vaccine Taskforce members. In their response, Oxford again refused to disclose Bell's financial interests with industry, stating that the university only publishes the financial disclosures of members of council, its governing body, of which Bell is no longer a member.

BEIS also refused to disclose details of Bell's alleged reporting



IS FREEDOM OF INFORMATION BEING UNDERMINED?

Last year, openDemocracy released a report, *Art of Darkness: How the Government is Undermining Freedom of Information*, that found that central UK government departments are granting fewer FOI requests and rejecting more since the government passed the FOI law in 2000. Decision Notices about such stonewalling are given by the Information Commissioner's Office (ICO) and have increased by 70% in the past five years.

openDemocracy also documented instances of government officials flagging FOI requests that were filed by specific journalists, and they later detailed an "Orwellian" unit inside Michael Gove's Cabinet Office that acts as a clearing house to approve FOI requests. The unit collates lists of journalists with details about their work, including reporters at the BBC, the *Guardian*, openDemocracy, and the *Times*.

"If the Cabinet Office is interfering in FOI requests and seeking to work around the requirements of the act by blacklisting journalists, it is a grave threat to our values and transparency in our democracy," Labour shadow Cabinet Office minister Helen Hayes said to openDemocracy.

Geoghegan says that the government redacted the names and emails of who approved the official response to *The BMJ*, probably because BEIS was clearing

it through a political office within the government. "They're not looking to answer your questions in good faith," Geoghegan told *The BMJ*.

Earlier this month, over a dozen current and former newspaper editors signed a public letter calling for MPs to investigate the UK government's handling of FOI requests. Signatories included editors at the *Financial Times*, the *Guardian*, the *Mirror*, the *Sunday Times*, the *Telegraph*, and the *Times*.

of financial interests. "Members had to declare conflicts of interest at the start of meetings in relation to topics to be discussed and we can confirm Sir John Bell did so," BEIS replied. The department gave a similar answer to *The BMJ*'s request for financial disclosures by other Vaccine Taskforce members. "We can confirm that members declared conflicts of interest at the start of meetings in relation to the topics to be discussed."

Redacted responses

The need for financial transparency to ensure trust in science and medicine has long been recognised, including by Patrick Vallance, the government's chief scientific adviser. While employed at GlaxoSmithKline, Vallance wrote a 2005 commentary for the *Lancet*, stating, "Interactions with industry are important for medical advance, but they need to be open and unambiguous, and there is an institutional responsibility to ensure this is the case." Vallance continued, "Inferences should be drawn from attempts to hide interactions. These responsibilities are as true for patients' organisations as they are for professional bodies and universities."

The BMJ's information requests uncovered several emails showing government officials discussing our original emailed questions. Citing various exemptions to freedom of information, the



Should departments be fingering certain journalists as 'campaigners'?

Peter Geoghegan

government heavily redacted these communications. For example, 24 hours after *The BMJ* requested copies of any financial disclosure signed by Bell and other Vaccine Taskforce members, a BEIS official decided against any disclosure. Emailing his colleagues, he wrote, "Of course, we would not pass them any of the forms."

The government heavily redacted the emails and removed officials' names; however, one exchange implies that Bell did not fill out any conflict of interest (COI) forms. "Just confirm, there isn't any written COI from John?" one official asks. Another official then emails to ensure that the government alerts Bell that *The BMJ* is asking questions about his financial interests.

In the emails that the government released after *The BMJ*'s FOI request, officials also discuss *The BMJ*'s reporter. One asks if the government might be forced to make the information public through FOI requests: "This chap seems to have a bee in his bonnet about conflicts of interest more generally too. Could the COI declarations ever be revealed through an FOI?"

The BMJ's FOI request also uncovered a heavily redacted version of the BEIS response to our request in November for COI forms. The email's subject line is titled, "FOR CLEARANCE," but the government has blacked out multiple names and emails, hiding who had final clearance. A section of the official internal response characterises our

reporter as an extremist for sending the questions. "To note, the journalist looks like a campaigner on the issue of pharma companies influence on politics and has some quite extreme views on a verity [sic] of topics," the email reads.

"Should departments be fingering certain journalists as 'campaigners'?" asks Peter Geoghegan, a reporter with openDemocracy, who *The BMJ* asked to review the emails. "Is that their job? It's hard to see how that wouldn't have had an effect on their engagement with *The BMJ*."

The BMJ has previously raised concerns about Bell's financial ties to industry, during a campaign it ran from 2009 for access to the clinical trial data on Tamiflu (oseltamivir), with an open letter to Bell published in 2012. At that time Bell was on the commercial board of Roche and received \$420 000 from the company in 2011.

Since *The BMJ* approached Oxford University and the government last November about Bell, he has made appearances in many media outlets—such as the BBC, *Channel 4 News*, CNBC, and the *Financial Times*—to comment on public policy. Yet questions remain about the exact sum and nature of his self-confessed "long list" of financial investments, and how that might affect the government's coronavirus policy.

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Bell is reported to have shares in Roche, a company given a £13.5m government contract to provide covid-19 antibody tests

Jeremy Farrar: Ethically and economically it make sense to ensure the whole world has access to covid vaccines



Farrar worked at Ho Chi Minh's Hospital for Tropical Diseases for 18 years

"Once the UK has vaccinated our most vulnerable communities and healthcare workers we should make vaccines available to other countries," insists the infectious disease expert Jeremy Farrar. This could avert further public health and economic disaster, he says, describing it as "enlightened self-interest, as well as the right ethical thing to do."

In April 2020, soon after the first UK lockdown began, Farrar predicted that the UK would have one of the worst covid-19 death rates in Europe. As a member of the Scientific Advisory Group for Emergencies (SAGE) and the UK Vaccine Taskforce, he has criticised the UK government's covid-19 response for being too slow and too weak. He's positive about the current pace of vaccine deployment in the UK, however. "I personally would much rather vaccinate vulnerable people and healthcare workers elsewhere in the world than have the vaccine myself," he tells *The BMJ*.

Farrar also helps oversee the Access to COVID-19 Tools Accelerator—a global collaboration led by the World Health Organization, Gavi, the Vaccine Alliance, and the Coalition for Epidemic Preparedness Innovations, aiming to promote equitable access to new diagnostics, therapeutics, and vaccines (including the global Covax initiative).

Since 2013 he has led the Wellcome Trust, with its £1bn annual grant for global health research. Once an Oxford professor, he lived abroad for much of his life, including 18 years in Vietnam leading clinical research at Ho Chi Minh City's Hospital for Tropical Diseases. His work has focused on HIV, SARS, bird flu, and dengue fever outbreaks.

[There must be a public inquiry into how we've handled covid-19, not to blame individuals but to learn the lessons about what needs to be put in place](#)

The SAGE adviser and Wellcome Trust director tells **Mun-Keat Looi** how the UK government acted too slowly against the pandemic, about the perils of vaccine nationalism, and why he is bullish about controlling covid variants

Have the UK and the global community handled this pandemic well?

Experience shows that you must never, ever underestimate epidemics. This is the most important lesson I learnt in my 18 years in Vietnam. You have to be brave enough to act quickly, before you have all of the information. With an exponentially increasing epidemic, as soon as you get behind the curve it's incredibly difficult to turn it around.

By 20 January last year countries had enough information to know what was coming: you have asymptomatic transmission and mild illness, it causes people to die, and you can transmit it in a family or among healthcare workers. We had no human immunity, no diagnostics, no treatment, and no vaccines.

Every country should have acted then. Singapore, China, and South Korea did. Yet most of Europe and North America waited until the middle of March, and that defined the first wave. Countries including the UK were unwilling to act early, before they felt comfortable; were unwilling to go deeper than they thought they had to; and were unwilling to keep restrictions in place for as long as was needed.

I've been very critical of some UK policy making in 2020. There must be a public inquiry into how we've handled covid-19, not to blame individuals but to learn the lessons about what needs to be put in place.

The world valued efficiency above resilience. We have to revisit that, not just in public health but in all industries and sectors. We need to invest in resilience. We need surge capacity. We cannot run the NHS and health systems around the world at 105%: in the end they will fall over, as happened in 2020.

It's also only fair, when people get it right, to give them credit. The portfolio of vaccines that the UK Vaccine Taskforce put together, the distribution of vaccines, and societal engagement have been a remarkable success story.



MAGDA RAKITA

You can donate all the money in the world, but if somebody else owns all the vaccines countries can't buy them

Has vaccine nationalism surprised you—not least the row between the EU, AstraZeneca, and the UK?

The incident completely surprised me, but you can see why it happened. Vaccine supplies aren't yet enough. Many of us know people who have died or are sick with covid, and there's political tension as a result of Brexit as well.

We have to look at supply chains and where we manufacture vaccines. This isn't just a problem for Europe: there's little manufacturing in Africa, parts of Asia, and central and South America. We'll need technology transfer.

Major global providers of drugs and vaccines such as Russia, and particularly China, have a big role to play, as does India. But local access may depend on having more local manufacturing hubs, not only for vaccines but also essentials like dexamethasone and personal protective equipment [PPE], down to the vials that you put vaccines into.

This may create opportunities, as well. Countries with small populations but good manufacturing capacity will have opportunities in global as well as domestic supply: Singapore, Denmark, Senegal, or Ecuador, for example.

Is the UK government heeding your call to share vaccines globally once the UK's most vulnerable people have been vaccinated?

The argument has shifted in two months from a principle of fairness to a public health and economic imperative.

We're in a race as this virus evolves. It's no coincidence that we saw a fairly stable virus in the first nine months of 2020 but three major variants in the past three months as more people were infected. Evolution is essentially a numbers game: the more virus, the more mutations. Evolution is likely to pick up speed: in 2021 we will see new

variants with biological advantages that will be selected for if they escape natural immunity and vaccination.

The best way to reduce the chance of variants arising is to vaccinate everywhere as quickly as possible and drive down transmission. It's entirely reasonable that national governments consider their citizens first—that's realpolitik.

Once the UK has vaccinated our most vulnerable communities and healthcare workers, however, we should make vaccines available to other countries. It's enlightened self-interest, as well as the right ethical thing to do. I personally would much rather vaccinate vulnerable people and healthcare workers elsewhere in the world than have the vaccine myself.

The US Biden administration is open to this. China is open to this. I think the UK is also open to this. The UK is one of the biggest financial contributors to Covax. But it also needs to contribute vaccine doses. You can donate all the money in the world, but if somebody else owns all the vaccines countries can't buy them.

What about equitable access to treatments and diagnostics?

Vaccines are important, but we must not forget diagnostics, treatment, and PPE. Oxygen will save more lives in 2021 than vaccines, and supplies to many countries are precarious, which Wellcome and partners are working on.

It's the same with PPE for healthcare workers. If we don't protect them we won't have a health workforce post-covid. And then we won't have anybody to administer vaccines or for maternal child health, mental health, and everything else.

There's a global need for diagnostics for existing and new variants, sharing genomic sequencing data worldwide, and treatments for many years or decades to come.

Do you support the strategy of everyone getting a single dose first?

I strongly support vaccinating 20 million people once over vaccinating 10 million people twice, maximising the benefit for the most people. Otherwise there are issues about equity: how do I choose which 10 million to vaccinate twice?

Increasing evidence—particularly from Israel and the UK—shows that, to stop people getting sick, hospitalised, and dying, getting the first dose to as many people as possible was the right decision.

A longer delay between the first and second dose may confer longer immunity: that needs to be studied. We have a responsibility to gather the most robust prospective data we can, ideally openly through randomised trials.

Is robust follow-up possible now that vaccine trial participants have been unblinded for ethical reasons?

Approving vaccine candidates and rolling out early was the right decision. But it comes with risks, and it's crucial to gather the evidence. The easiest and fastest way of getting the most robust data would be to randomise transparently. If that's not possible because of policy implications, then the strongest observational data are required.

This follow-up is now difficult, but the UK has a responsibility to the world to do it. One advantage of the NHS is that tracking through general practice and hospitals is extraordinarily good. Data can be shared in unified health systems, which is massively in the public interest. Sweden, Denmark, and Germany can also do this.

Health Data Research UK brings together the data with Public Health England and NHSX from vaccinators, GPs, and hospitals. But there are so many confounders—people on two doses, age, ethnicity, whether you've been infected before, and waning immunity.

Should all data be published on vaccine candidates rather than selected results issued by press release?

I'm a bit more relaxed about this than others: there's a need at the moment for some information to be released right away. But it's unthinkable that an academic group or a company would not release data until publication in a journal, and the time between a press release and all of the data coming out has to be hours or days, not weeks.

Press releases must be honest to the data, not pretend that data don't exist. If subsequent data don't match, people should be held accountable.

When companies submit dossiers to WHO for prequalification the default should be that all of the data are available. But we have to respect some intellectual property rights, and I'm OK if there are proprietary details that cannot be released. But it's got to be the exception, not the norm.



If member states don't fund WHO properly and give it the status of the premier public health authority then it cannot live up to its responsibilities

Can vaccines ever be truly open source and non-profit?

The pharmaceutical industry deserves great credit: it has stepped up, using public money in some but not all cases, and invested in new plants and technologies. There's no way that we'd have these vaccines without industry.

Johnson & Johnson and AstraZeneca deserve credit for committing to non-profit accounting. In the longer term we'll have to make covid vaccines non-profit. Governments will have to invest up front in research and development for the vaccines, treatments, and diagnostics that are critical to national and global health and security.

You can't expect industry, with its commercial drivers, to invest in that. Inevitably, industry will be attracted to developing products where the risk is less or the return is faster. For example, they will get a better return on that investment in cancer care if they're successful versus disease outbreaks that may never happen or may happen only every 10 years or so. I'd favour a hybrid scheme: de-risked, government funded, but using the skills of the private sector.

This model could also work for things such as drug resistant infections. And maybe there are lessons to learn from other sectors, although not directly analogous to the healthcare or pharmaceutical industries. For example, industry doesn't carry all the risk of making an aircraft carrier and then think: who should we sell it to? Governments commission such work.

Is WHO fit for purpose to lead us through the next pandemic?

It has improved massively in the past five years, but it's too constrained by the member states. I'd like to see those states give WHO the power to act in pandemics. WHO should be funded to attract the best public health clinicians, technicians, and scientists from around the world.

I question sometimes whether the member states really want a strong WHO. If they don't fund WHO properly and give it the status of the premier public health authority in the world then it cannot live up to its responsibilities. To be held accountable for global public health but not have the authority or tools is the worst situation.

How does the pandemic end?

SARS-CoV-2 is now an endemic human infection. It's not going to disappear. We will learn to live with it as we have done with most other infections. With good tests, treatments, and vaccines, we can turn this into a preventable and treatable disease.

That's achievable in 2021: on that, I'm bullish. We'll have a range of vaccines that can be used across current and new variants. The pandemic will accelerate the development of vaccinology, drugs, and diagnostics—not only for covid but also for acute viral infections such as influenza, yellow fever, chikungunya, and dengue, where we've needed advances for years.

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