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Strategy for a Pandemic: The UK and COVID-19

Lawrence Freedman

In December 2019, reports circulated in the Chinese city of Wuhan that people were falling ill because of a new form of the severe acute respiratory syndrome (SARS) coronavirus. After a period of denial, Chinese authorities confirmed these reports. The whole city was quarantined on 23 January 2020. Unfortunately, by the time the virus's existence was acknowledged it had begun to spread. The second country to be badly hit after China was South Korea. Soon the virus reached Europe and the Middle East. On 11 February, the World Health Organization (WHO) announced that the new virus was to be known as SARS-CoV-2. The disease it caused would be called 'COVID-19'. It took another month for the WHO to declare a pandemic. There was now no other word to describe the phenomenon, with more than 126,000 cases reported (a substantial underestimate) and 4,628 lives known to have been lost (also a substantial underestimate).[1] Economic activity around the world was grinding to a halt. Markets were crashing as finance ministers and central banks rushed to devise rescue packages, all of which inevitably involved staggering amounts of debt. Thus, the new decade began with the event that will define it.

The threat to health was so dire that resisting the virus became an overriding priority, whatever the economic cost. Its virulence and lethality meant that its effects were of a different order than the normal seasonal flu, to which it was often inappropriately compared. Many of those infected showed no

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or only mild symptoms, but once it gripped an individual breathing became hard, often requiring intensive hospital treatment. Soon health systems in the most affected areas began to buckle under the strain as acute infections rose exponentially. Governments searched for measures, physical and non-physical, advisory and compulsory, to get the coronavirus under control.

It is unusual to have so many countries, varying in size, demography, socio-economic structures and politics, addressing the same challenge at the same time. There was a menu of available measures: stopping the virus at the borders through travel bans; containing it through testing and contact tracing so that infected individuals could be treated and quarantined; suppressing the rate of infection by banning large gatherings, closing schools and then prohibiting all but essential work and social contact. With some exceptions, governments in Europe and North America eventually found that they had little choice but to shut down most everyday social and economic activities.[2] This came with uncertainty about how countries could rebuild and recover, and get back to something approximating normal life. When would effective treatments and vaccines be available? How many of the 'social-distancing' measures would need to be maintained to prevent a resurgence of the virus?

The measures governments were able to adopt and the effectiveness of their implementation depended on how well prepared they were for this sort of contingency. Requirements included testing facilities, stockpiles of essential kit and sufficient intensive-care units, and then an ability to build these up as the pandemic took hold. Governments' choices, however, were shaped not only by these capacity constraints but also by their incomplete and evolving understanding of the properties of COVID-19. The stringency of the required measures had to be set against damage to the economy and the wider social fabric, and even the potential risk of popular discontent. As this was an international crisis, it also depended on cooperation among states. There was scientific and clinical collaboration on tests, treatments and vaccines, and the occasional sharing of scarce supplies and assistance with poorer countries lacking the resources to cope. Economic ministers had to work together to keep the world economy on life support. Yet at the same time there was competition to buy vital equipment, as well as the imposition of travel bans and border controls, even within the European Union.

It is now assumed that there will be an official inquiry into the British government's response to the crisis, investigating whether delays in imposing stringent measures led to an avoidably high number of deaths, and where responsibility lies for shortfalls in the provision of tests and personal protective equipment. Michael Gove, a senior member of the government, observed on 10 April that 'at some point in the future there will be an opportunity for us to look back, to reflect and to learn some profound lessons'.[3] The inquiry into the United Kingdom's role in the 2003 Iraq War, of which I was a member, took the view that when inquiring into a contentious area of policymaking, an essential first step was compiling a reliable account. This should be influenced as little as possible by the benefit of hindsight.[4] This article attempts to provide a preliminary account of the development of UK strategy on COVID-19, from the first evidence of trouble in Wuhan in early January to the announcement of the full lockdown on 23 March. As policymakers claimed to be 'following the science', this requires an analysis of the way that the expert community assessed the new coronavirus, the effects of alternative interventions intended to contain its spread and moderate its impact, and how experts' findings were fed into the policymaking process. It is preliminary because, while there is good material on both the policy inputs and outputs, the material on how the policy was actually made is more speculative.[5] In the concluding section I provide an even more preliminary evaluation of the British response, drawing on evidence from both Britain and other countries. This is unavoidably provisional, as the pandemic is still in its early stages and the effects – in health, as well as social, economic and political terms – will be felt for months and years to come. No final judgement is possible until the pandemic has been declared over.

Managing pandemics

An influenza epidemic is an annual event. Vaccines can contain its spread, but many people will be infected each year and, of those infected, normally one in a thousand will die. The human cost can be overstated in one direction, because those most vulnerable tend to have pre-existing ailments, and understated in another, because deaths are often attributed to respiratory distress, such as pneumonia, which tends to be the final killer. The WHO estimates that

the deaths associated from seasonal influenza vary from 290,000 to 650,000 globally each year.[6] In England, 17,000 people a year are estimated to die annually from flu, but this varies notably according to levels of pre-existing immunity to the prevalent strain, the take-up of the available vaccine and how well it has anticipated that year's strains of flu. Thus, in 2014–15 some 28,330 people died, while in 2018–19 the number was down to 1,692.[7] The 2019–20 seasonal winter flu was no more virulent than usual, did not impose great demands on hospitals and intensive-care units (ICUs) and did not lead to an exceptional number of deaths.[8]

Pandemics occur when a new and highly contagious viral infection appears for which there is no population immunity, a vaccine has yet to be developed and treatments are unavailable. One pandemic regularly recalled from the pre-vaccination age is the 'Spanish' flu that lasted from 1918–20, infecting up to a billion people worldwide and killing between 50 and 100 million.[9] More recently, the 'Asian' flu of 1957–58, which began in southern China, and the Hong Kong flu of 1968–69 were both thought to have infected up to 500m people globally and led to 1–4m deaths. In 2009, the so-called 'swine' flu infected around a billion people with estimated deaths of at least 150,000, but more likely closer to 500,000. Not all outbreaks killed as many as feared: the Middle East respiratory syndrome (MERS), first reported in Saudi Arabia in 2012 and associated with camels, was deadly for about a third of those infected, but produced only around 2,000 cases.

SARS, to which the current virus is most closely related, began, also in China, in November 2002, and by July 2003 had resulted in 8,437 cases and 813 deaths in 32 countries. Almost 95% of the cases were in the Western Pacific region.[10] The outbreak began with some atypical pneumonia cases in the southern Chinese province of Guangdong among people who handled food or sold wild animals. There were delays in reporting it, at first nationally and then internationally. Within China, administrative barriers and political disincentives prevented bad news getting to the capital. It was not until 11 February 2003 that the local authority reported the outbreak. Beijing resisted requests by the WHO for permission to send an investigative team. Soon it reached Vietnam, Hong Kong, Canada, Singapore and Taiwan. A Chinese doctor, who thought he was over the disease, stayed at an international hotel

in Hong Kong and became the 'patient zero' for some 4,000 cases.[11] Anxiety about the spread of the disease led to restrictions on flights from the affected countries, which hit their economies hard.[12] China and others were upset by the speed with which countries imposed bans on flights from infected areas, arguing that it had a big economic impact without necessarily making much difference. Gro Harlem Brundtland, then director-general of the WHO, supported the travel bans from the affected area and also complained about the delays in reporting the outbreak. While the Chinese government accepted that it must do better should something similar occur in the future, the episode also prompted it to encourage the WHO to be more sensitive to China's interests. For those countries most affected, the experience shaped preparations for future pandemics.

China was upset by speedy flight bans

Two subsequent instances illuminated the problems with when and how to sound the alarm, balancing prudent precautions against provoking panic. In 2009 the WHO was widely criticised for being too quick to call that year's swine-flu outbreak a pandemic, while in the case of Ebola in 2014 it was accused of failing to address a developing emergency quickly enough. The 2009 epidemic, which began in Mexico, was believed to be the result of the virus jumping from pigs to humans. Transmission from birds and animals is not unusual with new strains of flu, although in this case there was later a debate about whether pigs were responsible. Talk of swine flu prompted a number of perverse responses, including the slaughter of all pigs in Egypt and bans on imports of live pigs and pork products. Calling it a Mexican flu risked discrimination against Mexican people. The eventual preference was for a more technical description: H1N1-09.[13]

The WHO moved quickly from official notification of the first cases by the US in mid-April to an emergency meeting convened at the end of the month that raised the alert level, suggesting that a great pandemic was imminent. Countries moved early into emergency mode and prepared for a challenging period. Yet by this time there had been relatively few suspected deaths, and in the majority of cases there was no more than mild illness. In the event, in most Western countries H1N1-09 turned out to be no worse than seasonal flu, although in poorer parts of the world its effects were much more severe.

As questions arose, mistrust intensified with the discovery that the WHO's own influenza-pandemic guidelines, under which a high incidence of fatalities and severe illness was required to trigger an alert, had been removed from its website. There were allegations that pharmaceutical companies had precipitated the premature alert in expectation of profits. After a number of investigations, no evidence was found to support these claims, but the system was nonetheless found unfit for purpose.

The start of the COVID-19 pandemic

The COVID-19 pandemic began with a new infection appearing among stallholders at a Wuhan seafood market where wild animals (marmots, birds, rabbits, bats and snakes) were traded illegally. On 10 December 2019 came the first recorded case, a shrimp seller at the market who had probably been infected in November.[14] Although there has been speculation about different sources,[15] the original one appears to have been bats.[16] Soon local Chinese clinicians were commenting on the similarities to SARS, though they were told to stay quiet and avoid spreading dangerous rumours.[17] Taiwan investigated, and on 31 December warned the WHO of the danger.[18] Because, at Chinese insistence, Taiwan was not a member of the WHO, this report went unanswered, and was not passed to other countries. China did, however, inform the WHO on the same day of dozens of cases of pneumonia of unknown cause. It acknowledged that this was a new coronavirus a week later. The first reported fatality occurred on 11 January. Soon cases were appearing in a number of countries.

Tedros Adhanom Ghebreyesus, former Ethiopian health minister and the WHO's director-general, was close to China. He had been elected in 2017 with its active support, and regularly praised China's health system. While he did try to find out more about what was going on, and China released the genetic sequence of the new coronavirus on 13 January, his most visible and consequential role at this time was in repeating China's reassurances that there was not too much to worry about. The most important instance came on 14 January, when the WHO endorsed China's claim that while there was animal-to-human transmission of a novel coronavirus, there was as yet no evidence of human-to-human transmission. The WHO passed on this reassuring news in a tweet.[19]

On 23 January, after reporting 557 cases and 17 deaths, now assumed to be a significant underestimate, China announced tough measures to get control of the virus in Wuhan. The WHO's emergency committee, which had met the previous day and deferred declaring this a public-health emergency of international concern (PHEIC), was still reluctant to do so even after the Chinese announcement, on the grounds of continuing uncertainty about the extent of human-to-human transmission.[20] Even without the more accurate information that would have confirmed human transmission, it was always unlikely that a new zoonotic virus would spread to so many people. The WHO instead decided on a more 'intermediate level of alert'. On 28 January, a WHO spokesman was quoted as saying that the virus was 'not "wildly spreading" outside of China'.[21] A PHEIC was eventually declared on 30 January. Tedros was still reluctant to move to the next level. 'Using the word pandemic carelessly has no tangible benefit', he observed on 26 February, 'but it does have significant risk in terms of amplifying unnecessary and unjustified fear and stigma, and paralysing systems. It may also signal that we can no longer contain the virus, which is not true.'[22] At this point, the main country worrying about stigma was China.

The WHO requested information from China to better 'understand the epidemiology and the evolution of this outbreak', as well as the clinical features of the infection and best treatments. To stop the virus's international spread, China was to conduct 'exit screening at international airports and ports in the affected provinces'. This would allow for 'early detection of symptomatic travelers … while minimizing interference with international traffic'.[23] At this stage other countries were starting to get anxious. Major airlines were soon stopping flights from Wuhan. When first Italy (which had received its first infected traveller from Wuhan) and then the United States moved to ban flights, Tedros again cautioned that this would 'have the effect of increasing fear and stigma, with little public health benefit'.[24] China itself was restricting flights in and out of Wuhan and Hubei province to the rest of the country. By this time the virus was certainly well on its way around the world. Tedros praised China's tough response as early as 30 January as 'in many ways … actually setting a new standard for outbreak response'.[25]

The WHO's slow response to the developing crisis was later criticised. In late March, Japanese Deputy Prime Minister Taro Aso, furious that the 2020 Tokyo

Olympics had to be postponed until 2021, complained about its readiness to play down the crisis and wondered whether it should be renamed the 'Chinese Health Organization'.[26] In April, US President Donald Trump amplified these complaints and went so far as to suspend America's financial contribution pending a review. Yet two months earlier Trump appeared to consider the travel ban a sufficient response, and expressed confidence through February that Chinese President Xi Jinping had the matter under control.[27] In addition, other than issuing travel bans, the US did very little to prepare for a pandemic over the subsequent weeks. Part of the problem was that the initial tests developed for the United States' Centers for Disease Control and Prevention (CDC), a federal agency, did not work, which meant that it was unable to track the early spread of the virus in the US.[28] The CDC's funding had been cut by the Trump administration and the dedicated unit for public health at the National Security Council had been disbanded. The president sought to play down talk of a threat to the United States, lest it undermine confidence in the American economy.[29] As a result, far too little was done to prepare the US for COVID-19. This meant that the CDC was not playing the leading international role it had played in previous pandemics, when it had pushed scientific responses and encouraged international collaboration. So while many experts saw the looming dangers of a major pandemic, largely reassuring messages came from the country in which the outbreak had occurred, the leader of the country that had historically led international responses, and the organisation responsible for keeping the world informed about risks and remedies.

Developing UK policy on pandemics

Relevant UK experience went back to the Asian and Hong Kong influenza pandemics of 1957–58 and 1968–69 respectively. These had a big health impact, but the effects were largely managed by general practitioners, without much of a national plan.[30] In January 2002, the chief medical officer for England published *Getting Ahead of the Curve: A Strategy for Combating Infectious Diseases*, which identified a new pandemic as a particular disease threat. The somewhat anticlimactic SARS outbreak of 2003, which did not hit the UK, encouraged confidence that this was not necessarily a major area of concern. According to the 2008 National Risk Register:

> The likelihood of a new disease like SARS spreading to the UK is low, but if an outbreak of an emerging infectious disease occurred in the UK, and preventative measures were not put in place swiftly, the impact seen could be on the scale of the SARS outbreak in Toronto, Canada. Toronto had 251 cases of SARS in two waves over a period of several months.

This experience was taken to confirm that 'traditional public health and infection control measures can be successful in containing a new infectious disease'.[31]

H1N1-09 had a larger influence on policy, but also encouraged confidence that the country was well placed to cope. At the time, there was irritation with the WHO for inducing countries to over-prepare. An editorial in the *British Medical Journal* expressed relief that it had been a 'damp squib', but noted the high costs incurred as a result of 'panic buying of vaccines and antivirals'.[32] The episode had also highlighted problems with communicating scientific advice. Planning was based on the concept of a 'reasonable worst case scenario'. This was an awkward concept because the first word qualified the second, suggesting a case for which preparations were affordable rather than the worst that could happen. It was justified on the grounds that the truly worst was extremely improbable, but it still implied that reasonable meant probable. Professor Neil Ferguson, whose research group at Imperial College London was to play a leading role in 2020, explained to a parliamentary committee how the estimates in 2009 were quickly revised downward from the starting assumption of 2% case fatality, drawn from the established worst case for influenza epidemics, which produced a potential death toll of 65,000. Within a month, better data reduced this to 0.4%. It ended up at 0.1%.

Because of the lag between the new modelling and eventual official communications, the high number stayed in the public domain long after it had ceased to be 'reasonable'. By April 2010, after two waves of infections, the total number of UK deaths was 460. (There was a third, smaller wave that winter.) The effect was to undermine the credibility of the modelling and of the government. The chief medical officer, who doubted this number, was frustrated by the difficulty of explaining to journalists that the high number could not be a firm prediction.[33] The conclusions from H1N1-09 and other pandemics influenced the development of a national strategy, published in

2011. The introduction to the plan, reflecting concerns about past alarmism, noted the importance of preparing for 'pandemic influenza viruses of milder and more severe impact, rather than just focusing on the "worst case" planning assumptions'.[34]

The plan was backed up with an assessment of the scientific evidence. Using terminology that would become familiar in 2020, the assessment considered whether a pandemic could be 'contained' or else 'suppressed'. On the former the analysis was pessimistic, especially 'if the severity of infection was mild, such that many infected people did not seek care and, if found by contact tracing, did not meet the case definition for laboratory testing, so were never diagnosed and, hence, never treated, nor their contacts traced'. When it came to suppression (also described as 'mitigation') there was some optimism: 'depending on its nature', this could be achieved to a degree 'by the judicious use of a combination of behavioural and pharmaceutical interventions'. A range of measures could provide 'defence-in-depth'. These began with promoting 'habits of stringent respiratory etiquette and hand hygiene', cleaning of potentially contaminated surfaces, the use of antiviral drugs, pre-pandemic vaccination should a vaccine exist, and face masks and respirators to protect healthcare workers; and proceeded to school closures when transmission was disproportionately high among children, and restrictions on mass gatherings, including travel.[35]

Later studies on mass gatherings suggested that they could make a marginal difference in combination with other measures. Closing schools seemed to be of limited benefit unless they were a major setting for transmission.[36] The view taken in the national plan was that the government would encourage 'business as usual', so that the unaffected could 'carry on with their normal daily lives for as long and as far as that is possible, whilst taking basic precautions to protect themselves from infection and lessen the risk of spreading influenza to others'. The government did not 'plan to close borders, stop mass gatherings or impose controls on public transport during any pandemic'.

The guidance was updated in 2014 but not thereafter. There were occasional exercises to assess the quality of the plans. In October 2016, one known as *Exercise Cygnus* examined the impact of a flu outbreak with a high mortality rate, and warned of the danger of the health services being overwhelmed

and lacking sufficient critical-care beds, morgue capacity and personal protective equipment. Dame Sally Davies, the chief medical officer, concluded that the National Health Service (NHS) had failed the test.[37] Although the risks of having to cope with insufficient personal protective equipment and intensive-care ventilators was noted, with resources scarce and more immediate challenges facing the NHS, little was done to build up stockpiles. This exercise did lead to preparations for emergency legislation, planning for excess deaths, and recruitment and deployment of retired staff and volunteers.[38]

The next year the updated National Risk Register assessed 'the likelihood of an emerging infectious disease spreading within the UK … to be lower than that of a flu pandemic', but also less severe. With pandemic flu up to 50% of the UK population might experience symptoms, 'potentially leading to between 20,000 and 750,000 fatalities', while for an emerging disease the assumption was that 'several thousand people' would experience symptoms, 'potentially leading to up to 100 fatalities'.[39] The example employed of an emerging disease was not SARS but the Zika virus, spread by mosquitoes, which resulted in an epidemic in the Americas in 2015 and yielded a few cases in the UK after travel to infected areas.

Little was done to build up stockpiles

By 2020, therefore, the UK had identified a major influenza epidemic as the most serious threat. In preparation for such an outbreak, large supplies of antiviral drugs (Tamiflu and Relenza) were accumulated. Masks, gowns and gloves were also stockpiled. There was official confidence in the UK's preparations. When, in 2018, a biological-security strategy was published, the first sentence boasted that 'the UK is globally renowned for the quality of our preparedness planning and we have world-leading capabilities to address significant biological risks'. It also promised a 'UK government response plan for major international diseases to ensure that the government is fully prepared to respond'.[40] By the end of 2019, this plan had yet to materialise.[41]

Whatever the quality of the plans, a response to a new public-health emergency was bound to be shaped by available capacity. The system had been designed for efficiency more than resilience, with few hospital beds in reserve, staffing shortages and dependence on external sources for vital supplies.[42]

These were structural constraints, reflecting long-term policy and resource allocation. Because of these constraints, when the COVID-19 crisis came, extraordinary measures were required to expand capacity in the NHS, and address shortfalls in testing and provision of personal protective equipment.

The first response

When news came of a novel virus in Wuhan, the British government did have a plan available, albeit one based on a severe flu epidemic, with a mature conceptual framework, as well as a system in place to provide scientific and medical advice on its likely development. Sir Patrick Vallance, the government's chief scientific adviser, with a university and industry background in medical research, oversaw the provision of expert advice through the Scientific Advisory Group for Emergencies (SAGE). As a body, SAGE had met regularly through the H1N1-09 crisis and dealt with all aspects of that pandemic. Its lack of transparency in not publishing either its membership (on the grounds that this would subject members to undue influence) or its minutes had been criticised by a parliamentary committee in 2011, but this practice was still in place during the first months of the COVID-19 crisis. With its subgroups it represented a number of disciplines from 20 institutions. Three specialist groups that had played a major role with H1N1-09 were also active in dealing with COVID-19. These were the New and Emerging Respiratory Virus Threats Advisory Group (NERVTAG), the Scientific Pandemic Influenza Group on Modelling (SPI-M) and the Scientific Pandemic Influenza Group on Behaviours (SPI-B). The SPI-B was revived on 13 February 2020 to advise on how best to anticipate problems and help people 'adhere to interventions that are recommended by medical or epidemiological experts'.[43] SAGE met for the first time on 22 January to discuss COVID-19, a further nine times in February, and then ten times in March.[44]

Chris Whitty, an epidemiologist, was chief medical officer, with the responsibility for advising the government on public health. He co-chaired SAGE. The devolved regions (Scotland, Wales and Northern Ireland) all had their own chief medical officers. These officials, along with their counterparts from the Department of Health and Social Care (DHSC) and other agencies, handled the developing crisis in February. Senior government ministers and

advisers met to coordinate the national response in a committee known as COBRA (named after the Cabinet Office Briefing Rooms). This is the standard emergency format, originally set up to deal with the foot-and-mouth epidemic of 2001. COBRA met a number of times, with Matt Hancock, the secretary of state for health and social care, in the chair. The first meeting chaired by Prime Minister Boris Johnson, however, did not take place until 2 March.[45]

By this time the various advisory groups and officials dealing with the crisis had arrived at a consensus on the way forward. Its development can be traced by looking at the minutes of NERVTAG, the group providing the first assessments for the UK government and chaired by Professor Peter Horby of Oxford University.[46] On 13 January it met at the request of the DHSC to consider the 'Wuhan Novel Coronavirus'. As China, along with the WHO, was reporting no new cases since 3 January, the group concluded that 'the novel virus does not look to be very transmissible'. The international risk level was put as 'low/moderate'. By 21 January, NERVTAG was following lines similar to the WHO on human-to-human transmission. It raised the risk of the disease having a wide impact from low to moderate, but still assessed the risk to the UK as low.[47] Again following the WHO, it advised against transport bans.

When asked by the DHSC if this advice would change with multiple outbreaks in Chinese cities, the response was that in those circumstances 'it was unlikely that transmission to the UK could be prevented'. For this reason, and at this point, messages were sent out to raise awareness of the issue in the health service. On 22 January, SAGE met for the first time with senior government ministers in COBRA. Evidence was now emerging of the exceptional infectivity of COVID-19 and the likelihood that it would spread quickly and cause many fatalities. Yet, with the risk level low, COBRA felt able to take a relaxed view about the specific threat to Britain.[48] On 25 January, researchers from Imperial College London published their assessment of the state of the epidemic in Wuhan. They concluded that 'self-sustaining human-to-human transmission' was the only 'plausible explanation' of the Chinese outbreak, that over 60% of the transmission would need to be blocked to control the outbreak, that it was unclear that it could be contained in China, and so represented 'a clear and ongoing global health threat'.[49]

The potential seriousness of the situation was now recognised. NERVTAG met again on 30 January to agree a case definition (cough, fever and shortness of breath) and discuss treatments and tests. On 3 February, it considered hygiene and face masks, but not for now social distancing. A paper from the modellers for SAGE on 10 February warned that it was a reasonable probability both that outbreaks outside of China could not be 'contained by isolation and contact tracing', and that 'there is already sustained transmission in the UK'.[50]

The group met again on 21 February. The situation was now more serious. There was a paper from the London School of Hygiene and Tropical Medicine (LSHTM), along with Imperial College London an important source of pandemic modelling. The paper estimated that 'a single introduction' of the virus would have 'a 20–28% probability of causing a large outbreak' and that 'once four or more infections have been introduced into a new location, there is an over 50% chance that an outbreak will occur'.[51]

Italy's terrible experience would transform attitudes

China had shifted from counting only cases that had been laboratory-confirmed to including those that had been clinically diagnosed: the total number now was 75,465 cases, with 2,236 fatalities. There were now 1,259 cases outside China with 11 fatalities (two of which had been on the cruise ship *Diamond Princess*). By this time there were nine cases in the UK with no deaths. France had 12 cases and one death. In Italy, whose terrible experience would soon transform attitudes, there were then 21 cases with the first death that day.

Serious modelling could now be set in motion. The DHSC asked NERVTAG to model the reasonable worst case – what population could be infected, what proportion would be symptomatic, how many would require hospital care and ventilator support, and for how long. These estimates were vital if the health service was to prepare for a surge in cases. There was still considerable uncertainty around what had happened in China. If children contributed to transmission, up to 80% of the population would be infected in the absence of intervention, though 40% of those infected might be asymptomatic. The fatality rate outside of mainland China was 2–4%. In China it was much higher, possibly because only severe cases – perhaps 5% of the total – had been

detected. Older people were by far the most vulnerable but younger people could get infected as well.

At the time, the risk assessment used by Public Health England for COVID-19 was moderate. There was a debate about whether it should be moved to high, which was largely about whether there was sustained transmission outside of China. On the grounds that there was 'plenty of scope for escalation in the UK', and so time to raise the assessment, it was kept at moderate. Professor John Edmunds from the LSHTM, whose group had produced the paper warning of how few cases could cause a major outbreak, lost his video link at the meeting. He sent an email afterwards, arguing that the risk level should be 'high, as there is evidence of ongoing transmission in Korea, Japan, and Singapore, as well as in China'. His team then simulated an 'unmitigated COVID-19 epidemic' in the UK that resulted in 85% of the population being infected, 40% of those showing clinical symptoms, leading to 370,000 deaths by December 2021. At its peak, such an epidemic would require 220,000 ICU beds; in early 2020, the actual number of available beds tallied 4,562. Using only school closures as a possible intervention, which reduced the dead to 280,000, and taking Birmingham as an illustrative example, they presented this 'reasonable worst-case scenario' to the SPI-M on 26 February.[52]

The advice from the WHO was also becoming more urgent. It warned on 21 February that the 'window of opportunity' for preventing the virus's spread might soon close. The next day, the WHO's expert group was belatedly allowed into China. Its final report, published at the end of the month, provided more information to inform emergency preparations around the world. Members of the team praised China for scientific cooperation and commended its tough action to control the virus in Wuhan. Readers of their report in governments hoping to emulate the Chinese success would have been daunted by the description of what was required:

> more than 1800 teams of epidemiologists, with a minimum of 5 people/team, are tracing tens of thousands of contacts a day. Contact follow up is painstaking, with a high percentage of identified close contacts completing medical observation. Between 1% and 5% of contacts were subsequently laboratory confirmed cases of COVID-19, depending on location.[53]

The expert group did not, however, recommend that others lock down as thoroughly as China, at least in the first instance. It encouraged 'active, exhaustive case finding and immediate testing and isolation, painstaking contact tracing and rigorous quarantine of close contacts', while educating the general public 'on the seriousness of COVID-19' and how to prevent its spread. When it came to more 'stringent measures', such as suspending large-scale gatherings and closing schools and workplaces, it went no farther than urging 'multi-sector scenario planning and simulations'.[54]

Setting the strategy

By the time of the COBRA meeting on 2 March, the UK had 39 recorded cases and still no deaths. Through February the prime minister had been concentrating more on Brexit and flooding in the north of England, and nothing had emerged from the expert groups to make COVID-19 a high priority. That now changed. The paper prepared for the meeting by a reduced-membership version of the SPI-M known as the Scientific Pandemic Influenza Group on Modelling – Operational Subgroup (SPI-M-O) – a 'consensus statement' – reported: 'It is highly likely that there is sustained transmission of COVID-19 in the UK at present' and 'almost certain' that this would continue into the coming weeks.[55]

The SPI-M had met with the teams from Imperial College London and the LSHTM along with NHS analysts the previous day to set out what was known.[56] The critical number for understanding the virus's likely spread was the basic reproduction number R0, the average number of secondary infections produced by a single infected individual in an otherwise entirely susceptible population. (With seasonal flu R0 is around 1.3; with past pandemics it had approached 1.5, and may have reached 1.8 with the Spanish flu of 1918.[57]) On the basis of reporting on Wuhan, with the acknowledgement that UK circumstances might produce different results, R0 was put at 2.3. That would correspond to 80% of the population becoming infected, although not all would show symptoms. So long as R0 remained above 1, new cases would grow exponentially. One measure of the speed with which this would occur was doubling time, defined as the time taken for the number of new infections to double in size. The consensus statement put this at 4–6 days, which meant that the number of cases would grow until a peak was reached 3–5 months

after 'widespread sustained transmission' of the virus. This turned out to be an underestimate.

One of the challenges posed by the virus was its long 'incubation period', the delay between an individual becoming infected and developing symptoms. This could be on average five days, twice as long as for seasonal influenza, and it could be as many as 11. Those who might be infected therefore would need to be isolated for up to 14 days.

Most people who got the infection would not need hospitalisation, but a substantial number would – some 8% of those infected. This was the number that was now triggering alarm bells at the DHSC. New modelling based on Italian numbers had roughly doubled the previous estimate of 4–5%. It provided a grim warning on the potential burden on the health system.[58] Those hospitalised would be disproportionately elderly (44% of those over 80 against only 2% of those under 50). Among the total population, 8% of those over 80 could die compared with 0.01% of those under 20. The case-fatality ratio – deaths among those who showed clinical symptoms – could be anything from 0.25% to 4%. For people requiring hospitalisation, this rate would reach 12%, and for those requiring invasive ventilation it would go up to 50%. This would be equivalent to 8% of those infected overall. The implication, not spelt out, was that there could be half a million deaths in the UK. The paper did not go into detail about how to reduce transmission, noting many uncertainties and how even flattening the peak of a UK epidemic would not 'greatly reduce the overall clinical attack rate'. This would be true even with 'more stringent measures' that would have a greater impact. This reflected a paper by the LSHTM group that showed how none of the mooted measures – school closure, social distancing, elderly shielding or self-isolation – would make a big dent in the epidemic on their own. In combination, however, they could make a real difference.[59]

Later that week, Whitty told the Health Select Committee that the modelling suggested that the peak period would be intense: '50% of all cases over a three-week period and 95% of cases over a nine-week period'.[60] If this was true, the potential pressure on the NHS would be equally intense. Whatever could be done to flatten the curve, it was evident that the number of hospital beds and ventilators had to be increased substantially and urgently.

That sort of pressure made it hard to see how 'non-pharmaceutical interventions' could be avoided. The first step was straightforward enough. The public could be provided with advice on hand-washing and reducing contacts. Assuming the advice were followed, the peak of a UK epidemic might be flattened and extended, but not much difference would be made to the 'overall clinical attack rate'. If the aim was to get R0 down to around 1, more 'stringent measures' would be needed. But here came the quandary that shaped subsequent debates: if such measures were imposed, 'a large increase in cases would be expected once they were lifted'.[61]

For the moment no decisions were taken on the more stringent measures, although they were given their place in the 'action plan' approved by COBRA.[62] The strategy involved a sequence. The first, and current, stage was one of *containment*, which involved 'detecting the early cases, following up with close contacts, and preventing the disease from taking hold in this country for as long as is reasonably possible'. The next step was *delay*, when the most stringent measures would be introduced. This was 'about slowing the spread, lowering the peak impact of the disease and pushing it away from the winter season'. *Research*, already under way, focused on developing a vaccine and exploring treatments. *Mitigation* would emphasise 'caring for those who are most seriously ill and keeping essential services running at a time when large parts of the workforce may be off sick'. Over the following weeks this terminology changed, adding to the confusion surrounding the strategy.

The immediate objective was to get the public to concentrate on basic hygiene: hand-washing, sneezing in a handkerchief, not touching the face. When Johnson announced the plan the next day, he assured the country that the UK was well prepared for a likely increase of cases in the coming days and weeks, and reminded people to wash their hands with soap and hot water 'for the length of time it takes to sing Happy Birthday twice'.[63] In an interview on 5 March, he acknowledged that this was not likely to be enough. There was a theory, he noted, 'that perhaps you could take it on the chin, take it all in one go and allow the disease, as it were, to move through the population, without taking as many draconian measures'. This was not, however, his actual view: it would, he said, 'be better if we take all the measures that we can now to stop the peak of the disease being as difficult for the NHS as it might be'.[64]

The issue was timing. The country might see off the first wave of infections through extraordinary efforts, only to be faced with a more devastating second wave. Pulling down the peak would not reduce the number of people who would be eventually infected. Given the time taken to prepare and test a reliable vaccine, the more people the first wave left with a natural immunity, the better placed the country would be to cope with a resurgence of COVID-19. But if the interventions came too late, there would be a surge of cases in the first wave that could overwhelm hospitals. There was therefore a trade-off between protecting as many people as possible from the first wave and being best prepared for the second. The point at which the trade-off would have to be addressed depended on how fast the virus was spreading. If the doubling rate was 4–6 days, meaning the peak might not come for another few months, there was time for deliberation about the right mixture of measures. If it was more like three days, the situation would become more urgent, and the measures needed to slow the passage of the virus down would need to be tougher.

From containment to delay

Containment called for preventing infected people from entering the country, or at least isolating them and then tracing and testing their contacts. The basic problem was explained in a paper in mid-February: effective contact tracing required secondary cases to be discovered before they became infectious. According to the paper, the time from a 'primary case becoming infectious to the tracing of their contacts needs to be shorter than the incubation period'. When there were only a few cases this might be possible. As more contacts were unavoidably missed, however, containment looked increasingly futile.[65]

Stopping infected cases from getting into a highly connected country such as the UK was always going to be difficult. Heathrow Airport, for example, handles some 80m passengers a year. On 21 February, NERVTAG had concluded that as individuals flying into the UK were supposed to be screened in China when departing, there was little point screening them on arrival because they were unlikely to acquire symptoms en route. Direct flights from countries with COVID-19 were required to declare to airport authorities that all their passengers were well 60 minutes prior to landing. But given that pas-

sengers might well be incubating the disease, infected ones were still bound to be getting in, especially as the disease had spread to a number of countries.

The UK had developed a test as early as 10 January.[66] When a second infected person, who had picked up the virus in Singapore, appeared on 6 February, all his contacts were followed up with tests. But the number of infected contacts that were discovered confirmed just how infectious COVID-19 was. The problem at this stage was not a lack of tests given the presumed number of cases. It was reported on 5 March that there was a capacity to do 2,000 tests a day with a planned increase up to 3,200.[67] The difficulty was that there were starting to be too many potential cases to be followed, the helpline being unable to cope with the call volume. Cases started to appear around the country without obvious links to other cases.

A paper produced by Imperial College London summed up the daunting nature of the public-health task: 'Our results suggest that by the time a single death occurs, hundreds to thousands of cases are likely to be present in that population. This suggests containment via contact tracing will be challenging at this point, and other response strategies should be considered.'[68] Professor Yvonne Doyle of Public Health England explained that once into the 'third generation of contacts', enormous effort and expense would need to be put into trying to find hundreds of thousands of people of whom about 3% might test positive.[69] On 12 March, Whitty concluded that the effort was futile.

Although at this stage the UK was quite high on the league table of testing, the effort now appeared to stagnate, with little effort made to expand testing capacity. Research laboratories and other institutions capable of contributing were not mobilised until later. Because testing was given a lower priority once the containment phase of the strategy concluded, many in hospitals and care homes were left unsure about whether they or those with whom they were working were infected. This meant that they either self-isolated unnecessarily or went to work though infectious.[70] In addition, for some reason the previous advice to the prime contacts of those infected to self-isolate was rescinded, although it was soon reinstated.

What form, then, might a delay strategy take? Preliminary ideas were set out in a paper prepared in late February on 'non-pharmaceutical interventions'.[71] Four possible measures were identified: closure of schools; home

isolation of symptomatic cases for 13 weeks; voluntary household quarantine for 13 weeks; and social distancing for 13 weeks. Collectively, these measures would require all households to reduce outside contacts. Not one of them by itself was considered likely to reduce the peak on its own, but in combination they might, and together they could have a 'similar impact to that seen in Hong Kong or mainland China' and reduce R0 to about 1. To achieve substantially positive results, the measures would have to be enacted early and gain 'high levels of compliance over long periods of time'. But could this be achieved with the UK population? Much would depend on how well these measures could be explained to the public, and on managing their differential social impact, as those with low incomes would find it hardest to cope. At the same time, it was assumed that whatever formal control measures were adopted, some social distancing would happen naturally as people assessed the risk for themselves.

Those with low incomes would find coping hardest

This line of thinking gave rise to an additional strategy. The aim would be to apply more intense measures on those age or risk groups most likely to experience severe disease. Examples included household isolation of those over 65 and special measures around care homes. The majority of the population would then develop immunity, ideally preventing any second wave, while reducing pressure on the NHS. At this point there had been no investigation of the 'likely feasibility of effectiveness of such methods'. A 4 March paper also pointed towards this strategy.[72] An important motivation was the concern, evident in a number of submissions over this period, about gaining compliance with measures that might be effective in principle but considered unfair in practice. Thus the consensus was that school closures would be 'highly disruptive and likely to present an unequal burden to different sections of society … Isolation of entire households also poses a substantial, and unequal, burden on those affected.' In turn, conspicuous non-compliance would discourage those who were complying from continuing to do so, as would possible displacement activities, such as 'house parties, congregation of children in parks, and queues at takeaways'.

The interventions that would be most 'socially acceptable', 'legitimate' and targeted would be isolating symptomatic cases and 'at-risk members

of the public'. But the issue of fairness could arise if isolation were recommended to the elderly and the vulnerable but not to everyone else. The experts disagreed about whether this really was such a big issue. Against those who worried that it risked 'causing discontent', others argued that the measure could be persuasively justified. The argument chosen, however, seemed to appeal more to epidemiologists than to ordinary members of the public. The core idea was to show that those with the freedom to live their normal lives 'would be doing their bit by building some immunity' and reducing the risk of a later wave of infections.

Another issue was whether to escalate by increments as necessary or impose tough measures from the start. 'It is a political decision', the paper noted, 'to consider whether it is preferable to enact stricter measures at first, lifting them gradually as required, or to start with fewer measures and add further measures if required'. This was an important question, but there is no evidence that it was addressed directly, although the argument for a drastic approach for maximum effect had been made in the LSHTM paper of 2 March. So while there was no doubt that a serious health crisis was on its way, until well into March it was assumed that the peak was not imminent and that there would be time to introduce progressively escalating measures to keep it under a degree of control.

The decisions for the coming critical week on potential interventions were framed in a substantial paper of 9 March. This followed a gradualist approach.[73] The paper confirmed that the move to 'delay' would involve 'a combination of individual home isolation of symptomatic cases, household isolation and social distancing of the over 70s'. These measures alone promised to reduce peak hospital-bed demand by 50–70% and deaths by 35–50%. The paper proposed gradual escalation, starting with individual and household isolation over the coming two weeks. After that there would come social distancing of the elderly and vulnerable. No rush was implied, and the timetable was not rigid. The situation was being reviewed daily, however, so the trigger for the first steps could be pulled earlier if necessary.

The steps after that were still under debate: the stringent quarantine measures, as introduced in Wuhan, or the less draconian social distancing seen in Hong Kong and Singapore? Tougher measures would undoubtedly reduce

the spread of the virus, but would this mean a much higher peak in the second wave? Much would depend on public compliance, and whether there could be confidence that restrictions could be observed and then sustained. Enforced social distancing for the whole community was likely to see the biggest impact – with a substantial reduction in peak by up to 50–60% and of total deaths by around 20–25%. For these results, what turned out to be pessimistic compliance levels of only about 50% were assumed, with lower levels having only a negligible effect. Without going quite that far, two intermediate steps were mooted: school closures and the banning of large events. Both were now part of the wider public debate. The SAGE view remained that closing schools was a bad idea. Parents, including many in the health service, would have to take over childcare duties or else hand them over to grandparents, who occupied the age group most vulnerable to COVID-19. Nor were there obvious advantages in cancelling large events. The most serious contagion arose in small groups. Many came together at sporting events, and if these were cancelled, the same people were as likely to congregate in the confined space of a house or a pub.[74] All this assumed, of course, that the government would not also be closing down pubs.

This then was the position by 9 March. The expert groups were advising the government that it would soon need to set forth demanding isolation rules for those with symptoms and their households. The next step would be to find ways of shielding the elderly and most vulnerable from the effects of the disease by encouraging them to stay at home. No strong case was made for school closures or shutting down large events, but these would be next on the list. Farther down the line, enforced social distancing might be considered. The strategy was therefore incremental, with no abrupt implementation of stringent measures across the board.

A strategy awry

In addition to this advice, the implementation of the strategy was influenced by two other factors. One was simply a matter of timing, but was a major distraction. On 11 March, the Chancellor of the Exchequer delivered his annual budget speech. Only with that out of the way could political attention return fully to COVID-19. The other was the prime minister's reluctance to take

steps that would interfere with personal freedoms and the functioning of the economy.[75]

Also on 11 March, with 114 countries now reporting cases, the WHO at last declared a pandemic. The news for the UK when COBRA met the next day was that the number of reported cases in the UK had risen to 590. Reported deaths, now creeping up, numbered ten.

COVID-19 had turned into a full-blown European crisis, with reported cases and deaths growing exponentially. The situation in Italy was particularly dire and had developed with frightening speed. The number of deaths reached 50 on 2 March and a week later was 463. The doubling rate for new cases was 3–4 days, but not all cases were being detected. The doubling rate for deaths was 2–3 days. A WHO rapid-response team that concluded a visit to Italy on 6 March drew attention to the country's importance when updating modelling, describing it as a 'knowledge-generating platform'. What it did not do was point to a need for major interventions to enforce social distancing on countries. Instead, it recommended only preparations along the lines of 'surveillance, clinical management, infection prevention and control, and risk communication'.[76] Yet soon the Italian government had little choice but to resort to drastic measures. The worst-hit area of Lombardy was closed down on 8 March. (Some municipalities had been put in quarantine in February.) The next day Prime Minister Giuseppe Conte announced restrictions covering the entire country, banning most travel. These were extended on 11 March to cover nearly all commercial establishments, other than supermarkets and pharmacies.[77]

Other countries were also following strategies quite different from those of the UK. France had abruptly moved from relative complacency to anxiety. The previous week, President Emmanuel Macron had conspicuously visited the theatre with his wife, urging people to keep going out, while the Louvre Museum closed and then reopened. On 10 March, with 1,606 cases and 30 deaths, he banned gatherings of 1,000 people or more, and the next day announced that schools would close. By 14 March, restaurants, cafes and all non-essential businesses were shuttered, although the first round of the French municipal elections did go ahead on 15 March. Spain, in a similar position, with 1,622 cases and 35 deaths, closed schools in several regions, including

Madrid, and suspended flights from Italy. Belgium recommended postponing indoor events with more than 1,000 people. Germany, with 1,295 cases and two deaths, announced the closure of all theatres, concert halls and opera houses in Berlin, and banned gatherings of 1,000 people or more. Schools were asked to prepare for lockdown. Greece, with 89 cases, closed schools and universities. Denmark blocked air traffic from hardest-hit countries. Ireland cancelled the St Patrick's Day parade.

Britain was doing none of these things. The steps Johnson announced after the COBRA meeting on 12 March conveyed no sense of urgency.[78] He was preparing the public for bad news – 'families are going to lose loved ones before their time' – and, using the terminology of the action plan, he explained that the government was moving from attempting to contain the disease to delaying its spread. But the steps announced were modest and tentative. Those with symptoms were told to stay at home for seven days, and those over 70 advised not to go on cruises. He did not rule out the gradual introduction of more draconian steps 'at some point in the next few weeks', but he did not even take the next big step of urging the elderly to cocoon themselves at home. Somewhat belatedly, the risk to the UK was now moved from moderate to 'high'.[79]

Public gatherings were not to be banned, even though such a ban had been an issue on the COBRA agenda and was being actively debated in the media. SAGE had asked all of its subgroups to review the evidence on whether this would have a positive impact. The advice was the same as before: it was unlikely to be of much benefit. And there remained the issue of whether the most vulnerable could be asked to stay home while everybody else was out enjoying themselves. Was it possible to delay 'widescale social isolation at the same time as recommending isolation to at-risk groups'?[80] The group remained divided, but the decision was to justify the discrepancy by stating that those less vulnerable to the most acute forms of the disease were acquiring herd immunity, making it easier to cope with the second wave. This issue of herd immunity – a well-established epidemiological concept[81] – was a matter of real concern. The degree to which it could be achieved would make a difference to future rates of infection. But because of the uncertainties it could not be a sole driver of policy. The driver was the need to flatten the curve, and if cocooning the more vulnerable did not work, then the less vulnerable were going to face

their own restrictions. Giving it high prominence now was always likely to convey a misleading impression of the direction of policy.

The issue was introduced the night before the COBRA meeting when David Halpern, chief executive of the Behavioural Insights Team and a member of SAGE, described to BBC News the strategy of shielding vulnerable people until enough of the UK population had been infected with COVID-19 to acquire immunity.[82] The next morning, ITV's political editor Robert Peston, having been briefed on the concept, laid it out in similar terms, emphasising that this immunity would need to be acquired at 'a much-delayed speed so that those who suffer the most acute symptoms are able to receive the medical support they need'.[83] The next day, Vallance elaborated on the idea. Like the others, however, he did not suggest that herd immunity was the whole strategy.[84]

As an approach to communicating risk, this turned out to be a disaster. The implications were as alarming as the terminology was striking. It appeared that the government was preparing to let the disease rip through the community as part of a cold-blooded experiment in disease management. A more positive argument would have explained that the aim was to 'deploy extreme cocooning of the elderly to shield them from severe disease and manage the epidemic such that it did not exceed healthcare capacity', which would have had clear advantages economically.[85]

Halpern's comments and the briefing to Peston anticipated that the government would agree on 12 March to the shielding policy for the elderly and those at risk because of pre-existing conditions. But as nothing along those lines was announced, all that was left was herd immunity. Moreover, the effort to use this notion to justify carrying on with mass gatherings was rendered pointless by the fact that they were becoming practically untenable. Events were being cancelled and postponed. The Football Association took the initiative to suspend all fixtures, starting with those scheduled for Saturday, 14 March.[86]

This should not have come as a surprise. It was known that in these situations people act without waiting for the government's instructions as they make their own risk calculations. Furthermore, while the expert groups were checking on what was going on in other countries, so were the media. As the SPI-B noted, there was growing interest in the 'public health strategies in other countries', which could generate concern if the UK was ignoring measures that

others perceived to be effective. The government had been tracking opinion through polling since February. At the beginning of March, only about a third of those polled agreed that large sporting events should be cancelled. But since then, opinion had shifted, and a majority was now in favour of cancelling them. Having assumed it was pointless to implement measures that would face popular resistance, make scant difference and even be counterproductive, the government now confronted rising popular anxiety and accusations that it was exposing the population to unnecessary risk.

As the negative reaction turned on a combination of a perceived lack of decisive measures and suspicions about the meaning of herd immunity, the SPI-B added a postscript to the paper that had been tabled the previous day. Having 'pointed out repeatedly that trust will be lost in sections of the public if measures witnessed in other countries are not adopted in the UK and that not pursuing such routes needs to be well explained', the group added that while 'communications was not within their remit … this point bears repeating again'.[87]

People act without waiting for government

The next day the group circulated a paper explaining its role. Thus far, it had met three times and had given advice on a number of issues, including the risk of public disorder, which was not considered high. The group's advice had been, its members recalled, that there was 'a likely high level of public support for the cancellation of mass gatherings or general social distancing' and that 'isolation of symptomatic cases is likely to make intuitive sense to many people'. They also warned about the inadequate evidentiary base for the coronavirus. The new context was very different to the swine-flu outbreak and it was 'not clear how well the evidence translates' from that episode. The paper concluded:

> The group's overarching recommendation was a need for Government to provide clear advice that takes account of public concerns and suggests behaviours that reduce risk. Transparency will help people understand the risk and build trust. People should be treated with respect, capable of taking decisions for themselves and managing personal risk.[88]

The strategy recovered

The problem for the government was that it now appeared to be following rather than leading public opinion. A poll in the *Observer* on 15 March showed that just over a third of the population trusted the prime minister's management of the crisis, and 40% thought that the government had 'underreacted'.[89] Jeremy Hunt, the former health secretary and current chair of the Health Select Committee, warned that this was a 'national emergency'. Asked about the decision not to cancel large gatherings, he said people would be 'surprised and concerned' that the UK was not moving quicker.[90]

By that time, the strategy had already begun to shift. Hours after the COBRA meeting, on the evening of 12 March, SAGE met again to hear from Professor Ferguson on the results of his group's latest modelling. The conclusions, which were made public on 16 March, were startling. What had made the difference was evidence from Italy suggesting that the R0 was more like 3 than 2.5 and, most importantly, that previous estimates of intensive-care requirements had been optimistic.[91] The analysis considered two countries – the US and the UK – and how the pandemic might develop with or without 'non-pharmaceutical interventions'. Somewhat confusingly, given the past definition, the existing policy was described not as 'delay' but as 'mitigation', which aimed to slow if not stop the epidemic's spread 'by reducing peak healthcare demand while protecting those most at risk of severe disease from infection'. This was the approach that the UK had not quite reached that morning. The alternative was now described as 'suppression'. With this approach, the goal would be 'to reverse epidemic growth, reducing case numbers to low levels and maintaining that situation indefinitely'.[92]

The warning was clear: without mitigation, deaths could be as high as 500,000; even with mitigation, while deaths would be reduced, 'health systems (most notably intensive care units)' would be 'overwhelmed many times over'. This would be felt as early as the second week in April, and eventually 'surge limits for both general ward and ICU beds would be exceeded by at least 8-fold'. This could still result in some 250,000 deaths. Suppression, therefore, needed to be adopted 'imminently'. With it, the system could cope and deaths could be kept down to 20–50,000. The problem was that this approach probably would have to be maintained for 18 months or more before a vaccine

became available. If measures were relaxed at some point, they might still need to be reintroduced should case numbers rebound.[93]

This stark warning injected new urgency into the debate. Whitty and Vallance now realised that the numbers with which they had been working, which had seemed bad enough, had significantly underestimated the threat. Having assumed that Britain was far away from the Italian situation, it was now apparent that it could quickly catch up. Dominic Cummings, the prime minister's controversial chief of staff, who had previously entertained some sympathy for the idea of herd immunity, now began to work with Hancock to persuade Johnson to accept the sort of drastic action from which he instinctively recoiled. By Saturday morning the new strategy had been set. Johnson agreed that 'all necessary measures' must be taken. Hancock, who along with Johnson had never liked the term 'herd immunity' because it sounded too defeatist, insisted in an interview, in which he also talked about the challenges of shielding the elderly, that 'herd immunity is not our policy. It's not our goal. Our goal is to protect life and our policy is to fight the virus and protect the vulnerable and protect the NHS.'[94]

On the morning of 16 March came a blunt paper from the SPI-M. The measures first envisaged – case-by-case isolation, household isolation and social distancing of vulnerable groups – and yet to be announced were 'unlikely to prevent critical care facilities being overwhelmed'. Everything now had to be tried, including 'general social distancing and school closures', which offered the best chance of disease control. 'There would be a two–three week delay between measures being put into place and their impact being felt in ICU.'[95]

The prime minister addressed the country that evening with a more urgent tone. Everyone was requested 'to stop non-essential contact with others and to stop all unnecessary travel'. The most vulnerable, especially those over 70, were to be prepared to stay home for up to 12 weeks. The public were already taking their own action. By 18 March there was a 40% reduction in transport use in London. Some 45% of Londoners had stopped visiting leisure venues. Up to 30% were no longer seeing their families and friends. Only supermarkets were busier as people stocked up. The total lockdown of London was rejected, but schools were told to close for most pupils

(other than the children of key workers). The logic was now inexorable. If any close contact gave the virus an opportunity to spread, why should any be allowed? If voluntary compliance with social distancing was insufficient, should it not be enforced? On 20 March, pubs, clubs and restaurants nationwide were closed. Rishi Sunak, whose previous week's budget was now out of date, submitted a package of emergency measures to prevent a collapse in businesses and employment. A poll now found that 59% of the British people believed that the government was now handling the crisis well, and accepted every tough measure.[96]

On the evening of 23 March, Johnson announced that people must now stay at home except for essential purchases, work and travel, medical needs, one exercise per day and providing care for others. All public gatherings and social events except funerals were prohibited, and most retail businesses closed. For the meetings that day two papers had been presented for discussion. The first, prepared by the modellers, warned that the situation was becoming desperate. The R0 might previously have been 2.4; it was now 3. The doubling time for cases reaching ICUs was perhaps 2–3 days. London's capacity to cope might be breached by the end of the month, with the rest of the country 1–2 weeks behind. The measures already taken would not show their effects until around 10 April. More worrying, the pressure on ICUs was being driven by 'nosocomial' transmission within hospitals (care homes were not mentioned). The advice a week earlier had led to a dash to acquire more ventilators. Now there was a need for more hospital capacity.

The paper from the behavioural-science subgroup advised on improving adherence to social-distancing measures. The government needed to sharpen up its guidance, become more specific and promote a 'strong collective identity'. There were too many imprecise phrases and not enough just instructing people what to do. The key message needed to emphasise the value of actions as a way to reduce the threat. People would help not only themselves but also others, enabling the health system to cope. In addition to social pressure, legislation might also be necessary to compel social distancing. The group expressed concern that this sense of responsibility had been undermined by 'messaging around the low level of risk to most people and talk of the desirability of building "herd immunity"'.[97]

Mistakes were made

The awkward change of gears in mid-March pointed to a desperate attempt by the government to regain the initiative after falling behind other countries in its response. Accordingly, British strategy has been sharply criticised. Richard Horton, editor of the *Lancet*, was one of the most trenchant commentators. He argued that despite warnings from China and Italy, valuable time was lost and with it, lives. 'We had the opportunity and the time to learn from the experience of other countries. For reasons that are not entirely clear, the UK missed those signals. We missed those opportunities.'[98] *The Economist* asked 'What Went Wrong?'[99] A *Sunday Times* article on 19 April spoke of 38 lost days when nothing was done.[100]

The most shocking indictment was that time had been squandered in the pursuit of a callous policy of herd immunity until it was belatedly replaced by the more prudent strategy of suppression. The government compromised the potential success of this strategy, the case continued, in being either too slow or too inept to make proper preparations with regard to ventilators, tests and personal protective equipment, which made it even harder for those on the front lines of hospital and social care to cope. Other lines of criticism, not assessed in this article, were concerned with the design and implementation of the measures introduced to support the economy and the human-rights implications of the emergency legislation introduced to support the lockdown.

The preliminary nature of any assessment of policymaking undertaken before all the papers have been released and, most importantly, well before the pandemic has run its course must be emphasised. In a few years, the events of this first stage may have been overshadowed by those of later stages. The second and third waves of the Spanish flu were deadlier than the first. In addition, the question is not what should have been done knowing now the effects of this first stage, but what might have been done given what was known at the time. Here was a new and poorly understood virus, with its scope and direction uncertain – coming in either like a strong wind, perhaps barely touching those at its edges, requiring temporary shelter, or else a hurricane, potentially overwhelming those in its path. As Mike Leavitt, a former US secretary of health and human services, observed: 'In advance of a pandemic, anything you say sounds alarmist. After a pandemic starts, everything you've

done is inadequate.'[101] With hindsight there were always two core strategies available to deal with the first stage of the COVID-19 pandemic. The distinction between them was not clear-cut and all countries had elements of each, but in both cases success required thorough implementation.

The first strategy, and the ideal one, was to contain the coronavirus before it got a grip on the population. This was the strategy largely followed by governments in places near China, drawing on the experience of SARS, such as Hong Kong, Taiwan, Singapore and South Korea. It involved controls on entry, curtailing incoming flights, extensive testing and contact tracing. Of these four locales, only South Korea suffered large numbers of cases and fatalities, but that was largely confined to a religious community that was effectively quarantined as soon as its infection was discovered.[102] As all barriers were permeable, the success of the strategy depended on finding sufficiently few cases to make contact tracing possible. Because of COVID-19's long incubation period and ease of transmission, this strategy was always going to be easier for relatively small places with few points of entry, advanced testing capability and an ability to trace and reach contacts using personal information garnered from smartphones and other forms of surveillance. By preventing transmission from the start, this strategy also meant that a relatively small proportion of the population would have natural immunity, and so there was always a possibility of sudden outbreaks of clusters of cases, as happened in Singapore.[103]

The second strategy – not at all ideal – was to take vigorous action to suppress the disease by reducing all human interaction. No country other than China followed this path until the virus hit Europe and North America full force, whereupon it became the norm. There was clear evidence that it worked at least in the short term. In general, the earlier and more rigorous the suppression imposed, the flatter the arc of the disease. The one country to challenge the norm, paying more regard than others to herd immunity, was Sweden.[104] The challenge was greatest when the virus got into densely populated areas and in particular cities like London, the largest in Europe. Italy was the first country to move to full-scale suppression on 9 March. The measures imposed in Berlin on 10 March probably made a substantial difference to the German spread, but in other countries the pattern was of incremental steps moving to a full lockdown during the week beginning 16 March.

The UK took few steps during the week beginning 9 March, and only got into its stride on 16 March. Full lockdown did not come until 23 March. This does not mean, however, that there were no effects until that culminating point. People and organisations were making decisions of their own accord from 9 March. By the end of that week, 70% of people polled said they had already changed aspects of their behaviour in some way.[105] The government's successive announcements from 16 March, which were often telegraphed in advance through media briefings, prompted more widespread and substantial social distancing.[106] An earlier, more decisive imposition of the social-distancing measures could well have diminished the extent of the virus's transmission, but that would still have depended on high levels of compliance. It is also possible that the gradual route followed, against the backdrop of a growing sense of emergency across the continent, meant that people became more accepting and better prepared. Certainly, the levels of eventual public support and compliance were high – far higher than originally anticipated by the government. One report in early April found that although the broad figures hid a variety of views, there was 'near-universal support (89%) for the current measures' and that the public had 'a clear view of the seriousness of the health threat from COVID-19, and large majorities understand most of the key actions required of them'.[107]

The challenge was greatest in cities like London

In all countries that followed this path, the caseload in hospitals accelerated and then eventually decelerated. As suppression strategies only worked over time, and for every case that took an acute form at least a hundred involved relatively mild symptoms or none at all, a portion of the population might have been infected – perhaps over 10% of the total. But it was still unclear how much infection conferred immunity, or for how long. Herd immunity was still some distance away.

Most importantly for the government, it met its main target, which was to flatten the curve before the health service was overwhelmed. At the end of April, Whitty estimated that the R0 was below 1, and possibly around 0.75.[108] On the measure of demands on hospital beds, the UK epidemic peaked on around 9 April, although there were regional variations.[109] When actual dates

of death, as opposed to those reported, were considered, hospital deaths may also have peaked around this time.[110] An analysis based on daily reporting by more than 2.5m people suggested that the number of individuals showing COVID-19 symptoms was around 2m on 1 April and had then halved every week.[111] Given the known sequence for infection, incubation, hospitalisation and death, it is reasonable to conclude that changes in behaviour were having an effect well before 23 March, especially in London.

With better comparative numbers it will be possible to see how much the profile of the UK national epidemic was actually behind those of other countries. The city did not struggle for available beds, which meant that, fortuitously, ventilators turned out not to be as big a problem as anticipated.[112] Indeed, having built new hospital capacity around the country with impressive speed, it then found that very little of it actually had to be used. But there were major difficulties with getting personal protective equipment to front-line staff in the health service, care homes and services, which cost lives and generated anxiety. This was a problem because of high turnover, logistical bottlenecks, and the challenge of replenishing stocks from external suppliers as international demand grew.

London did not struggle for beds

The simplicity of the slogan adopted by the government – 'Stay Home. Protect the NHS. Save Lives' – hid a tension. Ensuring the NHS could cope might have been a necessary condition to saving lives, but it was not sufficient. It created two problems, both of which were not fully appreciated by the government until well into April. Firstly, the effort to clear space to cope with the surge in numbers of COVID-19 patients not only required postponing non-essential operations, but may also have deterred individuals who needed urgent treatment from seeking it out.[113] Secondly, it prioritised hospitals over social-care provision, including care homes where 430,000 elderly people resided.[114] This may even have included elderly patients recovering from COVID-19, but still potentially infectious, being moved out of hospitals to free up beds and into care homes. Reports from Italy in early March had already highlighted the high risk of infection and death in this sector. The WHO estimated that 'up to half of those who have died from COVID-19 were resident in long-term

care facilities'.[115] There may have been limits on how much the disease could have been contained in a fragmented sector, comprising more than 20,000 care homes where elderly people live in close proximity, and where residents, staff and visitors will unavoidably mingle. But complaints about a lack of testing and protective equipment were even more insistent from this sector than from the NHS front lines.

A late-April report from Imperial College London, looking forward to the next stage, indirectly underlined how inadequate testing capacity compounded the vulnerability of all front-line staff in positing that 'weekly screening of health-care workers and other at-risk groups using point-of-care tests for infection irrespective of symptoms is estimated to reduce their contribution to transmission by 25–33%, on top of reductions achieved by self-isolation following symptoms'.[116] While criticism of the government will focus on the time it took to impose a lockdown, an equally important consideration may be the extent to which – once general contact tracing was no longer practical – the value of a testing programme targeting the health and social-care professionals who were most at risk from acquiring and transmitting COVID-19 was missed.

Vallance said on 17 March that 20,000 deaths would be a 'good result', compared to the 8,000 that might result from seasonal flu.[117] Even the official count, which only included hospital deaths, exceeded this figure. In addition, many more died outside of hospital. On 29 April, for the first time, the government figures for confirmed deaths included those from care homes as well as hospitals, adding 3,811 and bringing the total up to 26,097.[118] But this was widely assumed to be a substantial underestimate. Indeed, this was true for all countries, meaning that comparisons among reported death tolls were inherently unreliable.[119] Analysis of figures from the Office for National Statistics, which looked at 'excess deaths' as well as reported deaths, put the numbers much higher.[120] The disease targeted men more than women (60% to 40%) and disproportionate numbers from ethnic communities. What is striking from the numbers is just how much it hit the elderly: of 18,749 hospital deaths attributed to COVID-19 by 27 April, just over half were over 80, some 40% from 60 to 79, under 8% from 40 to 59 and fewer than 15 people under 40.[121] The younger people who died were often those with high exposure to active cases – especially those working with patients and the elderly – and therefore susceptible

to receiving a high dose of the virus. So, although the number of case fatalities was kept down from what it might have been, it still came in at a high level.

For many critics, the UK's high death toll served as an index of government failure, especially when compared with Germany's, and was best explained by the inadequacies of testing and the delays in moving to a full lockdown. The government could point to the regional variations in the effects of the coronavirus, the special impact on London, and how it was premature to declare a winner in some morbid race to fatality during the early stages of the pandemic and before proper analyses and comparisons could be made. Moreover, having been accused of not including those dying outside of hospitals to play down the scale of the tragedy, the government, when including those numbers at the end of April, used them to play up the tragedy as it urged the public to stick with the last two weeks of lockdown until 7 May, when some easing of restrictions might be introduced.

British officials always expected the government's strategy to be judged on how well it coped not only with the first wave of the pandemic, but with later waves as well. This was the basis for the bifurcated policy of early March, which envisaged protecting those sections of the population most at risk while allowing the rest to acquire immunity. The forecasts from the modelling on deaths and the ability of hospitals to cope once suppression measures were introduced were broadly correct. But the modellers had also warned of the difficulties of sustaining the measures, the problems of repeat lockdowns and the likelihood of more waves of infection. The first evidence from countries moving out of lockdown illustrated the difficulties of maintaining levels of social distancing, perhaps especially if the impact of the first wave had been less traumatic than feared. The government set a number of conditions for coming out of lockdown, of which the most important was that a second overwhelming peak of infections could be avoided. This would depend on how well the population would adapt to a new level of everyday risk, pending the arrival of a vaccine. The way forward would see a gradual relaxation of the strict measures combined with better testing and contact tracing, but this was unlikely to be the confident 'exit strategy' demanded of the government. There was no easy exit from the pandemic. The prospect was of more months of coping.

* * *

What assessment can we make of the strategy-making process during this first phase of the pandemic and the government's claim to have been following the science? The science depended on the quality of the evidence base, and that had some large gaps. Over time the base improved, but major uncertainties persisted. This meant not only that the experts could disagree, which they did, but that views changed as better information came in. 'If you think SAGE is a cosy consensus of agreeing', observed Vallance, 'you're very wrong indeed'.[122] It can be argued that the government could have consulted a wider range of experts, but in the end the politicians could not wait for a seminar to conclude. Someone authoritative had to take a position if there was to be any scientific input into the strategy. The government was not so much following the science as particular scientists, and then always had to consider the implications of their advice with reference to major non-scientific considerations, such as the economy and personal freedoms.

The advisory system drew on a range of viewpoints, from social scientists as well as clinicians and epidemiologists. They all struggled to understand the unique features of this pandemic, perhaps the social scientists most of all. Once the hard scientists had the genetic structure of the pathogen and the epidemiologists the hard data required to produce their analyses, they would have a formidable influence on policy. Few research papers can ever have had the national and international impact of the Imperial College London analysis published on 16 March. Social science, however, was dealing with an unprecedented situation. While many of those involved soon appreciated this, they began with analyses based on the H1N1-09 experience. One of the reasons for hesitation was concern that a lockdown would be hard to sustain, that there would be 'behavioural fatigue' with people becoming progressively less rigorous in observing the constraints. Hancock spoke of evidence that people 'tire of these sorts of social distancing measures'. It was one of the issues that influenced some of the earlier epidemiological models on the value of stringent measures. Members of the SPI-B, however, did not advance this argument. Three later wrote a paper dismissing this approach as paternalistic, pointing to the possibilities of collective resilience, and urging that the advice from behavioural psychology be

used to reinforce rather than undermine the best medical advice.[123] In the event, although the lockdown was stressful, the public observed it far more diligently than anticipated, and became reluctant to see it lifted until they could be sure it would be safe to venture out. As the period of full lockdown approached its end, there was an issue of how people could be persuaded to take the risks required to get schools open and the economy moving, but then also once they had been so persuaded whether it would be possible to later persuade them to return into social isolation. It was always a challenge trying to predict likely behaviour in wholly unique circumstances, when people would be taking their cues from what was going on in other countries.

Could the expert community have done more to get the government on a 'war footing' earlier? A serious outbreak in the UK was possible as soon as cases started appearing outside of China, especially given the ease of global travel. But it was one thing to know how bad the pandemic could be if certain conditions were met, and quite another to be sure enough to sound the alarm. Here perhaps the advisers were influenced by an institutional memory of the overreaction to swine flu. An article in the *Lancet* posted on 17 February 2020, for example, referred to a piece published on 31 January, which posited that 'independent self-sustaining outbreaks in major cities globally could become inevitable because of substantial exportation of presymptomatic cases', but described this as 'speculative' because of the number of open questions remaining about the virus, including the means of transmission.[124] It therefore required quite a leap of imagination from observing a spreading virus causing distress in China to describing how it might hit the UK. The case to examine is not whether a bit more imagination could have pushed the government to take drastic steps before the hit was apparent, but whether sufficient notice was taken to get in more ventilators, build up testing capacity and ensure stocks of personal protective equipment.

After the H1N1-09 experience, a number of recommendations had been made to improve the flow of scientific advice. One, from the Health Protection Agency, was to recognise that when decisions have to be made quickly with only limited information, interpretations may legitimately differ, and that it was important to record disagreements in SAGE. In addition, for the benefit of ministers and the Cabinet Office, 'a briefing should be prepared on the limits

of science and in particular of epidemiological modelling to manage expectations about what can meaningfully be delivered in what timescales'.[125] It is not known whether such a briefing was delivered on COVID-19 when SAGE reconvened in January 2020.

There was a flurry of excitement in late April when it was discovered that Cummings had sat in on some of the SAGE meetings. There is no evidence that he influenced the committee's deliberations, or that any advice was tailored to avoid upsetting ministers or conform to a predetermined policy.[126] In this respect, there is an obvious comparison to be made with the build-up to the 2003 Iraq War, when the Blair government was accused of manipulating the presentation of intelligence assessments to get support for an invasion. The conclusion of the Iraq Inquiry was that the problem was not that the experts had been persuaded to make assessments about Iraqi weapons of mass destruction in which they did not believe, but that their assessments reflected exactly what they did believe despite the lack of supporting evidence. This pointed to the dangers of groupthink among professional communities, a syndrome that might afflict epidemiologists and clinicians as much as intelligence analysts and military officers. The difference in this case was that new information was coming in all the time, reducing uncertainties and improving the models. These models had big political implications, but they were not as politically loaded as pre-war assessments. It will be a long time before the models can be properly assessed, but for the moment it seems that amplifying warnings did not push the country into rash action, and in fact may have come just in time to spare the country an even more desperate experience.

One lesson from the Iraq episode was that the quality of the answers provided by the experts depended in part on the quality of the questions asked. Politicians should not be passive recipients of whatever expertise comes their way, but should rather engage with the experts to explore alternative options and their empirical foundations. They are the ones, after all, who must explain what has been decided to the public. In retrospect, it is clear that the strategy developed during the first week of March assumed that the UK had more time to implement its responses than was available and more control over the development of the epidemic than was realistic. It was Johnson's responsibility, along with the relevant ministers, to interrogate this advice.

Known for his optimistic, blustery style and his inattention to detail, Johnson may have been naturally inclined to accept options that demanded the minimum rather than the maximum, and so content to be advised to follow a gradual path of escalation. How much did he question whether the proposed measures were sufficient or whether it was prudent to wait and see? Furthermore, it is supposedly a political talent to be able to read movements in public opinion. The strategy shifted not solely because of an updated model, but because significant numbers of people were becoming ill and frightened. They could see other countries following quite different and more comprehensive strategies and were becoming impatient with half measures. This is why, whatever the specific advice received, it can be safer for governments to stay with the pack than to follow their own customised route. By the time Johnson tested positive for COVID-19 on 26 March, he had already accepted that he had to implement the most stringent options. His hospitalisation on 5 April and close brush with death will have then left him with no doubts about the nature of the threat and that his decision was correct.

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