

Spotlight

HEALTHCARE: TECH AND INNOVATION

James Bethell / Jonathan Ashworth MP / Dean Russell MP



**Sophos stops
ransomware.**

Innovating in the public interest



One year ago, the World Health Organisation (WHO) declared the Covid-19 outbreak a pandemic. Cases outside China had been rapidly increasing. On the morning of 12 March 2020, the number of confirmed cases in Europe passed 20,000 and almost 1,000 people had died on the continent. Since then, more than 118 million cases have been recorded worldwide. At press time, the global death toll was 2,630,755, according to the John Hopkins University Covid-19 data tracker.

But amid the pain and the grief of the past year, between death counts and economic crisis, innovation and human ingenuity have given cause for hope. The development of Covid-19 vaccines has been the fastest in history.

The race for the vaccine has emphasised the importance of business, academia and government working together for the public good. Last April, Oxford University announced it was partnering with British pharmaceutical firm AstraZeneca to develop and distribute a vaccine. In December, it received regulatory approval, following those developed by Moderna and Pfizer and BioNTech. In January, 82-year-old Brian Pinker became the first person in the world to be injected with the Oxford-AstraZeneca jab. The UK government ordered 100 million doses while it was still in development, effectively subsidising the work.

Unlike the taxpayers' money spent on outsourcing less successful delivery of pandemic response efforts to private companies, such as contact tracing, this public investment in business has been key to the success of the vaccine drive. According to Airfinity, a life sciences analytics firm, the UK and US spent approximately seven times more per capita in advance on development of Covid-19 vaccines, procurement and production than the European Union.

The world is much changed since the WHO's declaration a year ago, and with it, healthcare – from vaccine development to the tech transformation of pandemic-era health services. This past year has been a reminder of how the private and public sector can work together in the public interest, investing taxpayers' money responsibly. This month, the Public Accounts Committee slammed the “unimaginable” cost of NHS Test and Trace, with consultants being paid £1,000 a day. The race for the vaccine shows that government can spend more wisely. ●

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News



Public confidence in vaccines grows

Jonny Ball

A survey by Imperial College has found that confidence in Covid-19 vaccines has increased since their regulatory approval late last year. Beginning in November 2020 and concluding in February, the survey took place across 14 countries with 13,500 participants, revealing that 58 per cent of people would take up the offer of a vaccine. In nine of the 14 countries, people's confidence had grown over the four-month research period. According to the most recent phase of the survey in February, the UK had the highest levels of trust in the vaccine, with 77 per cent saying they would take up

the offer of an injection. In France, only 40 per cent of respondents said they would be willing to get the vaccine. This figure, however, had increased by 15 percentage points from just 25 per cent vaccine trust in the initial stages of the study in November.

Over a third of the UK's population have now been vaccinated against Covid-19 using both the Oxford-AstraZeneca and Pfizer-BioNTech jabs. The figure for the European mainland is far lower, and has been beset by supply issues and public spats between the European Commission and manufacturers.

MHRA raises “concerns” over Babylon chatbot

Samir Jeraj

The Medicines and Healthcare products Regulatory Agency (MHRA) has said it has “concerns” about the safety of a chatbot used by digital GP firm Babylon Health. The chatbot uses AI to assess the likely condition of a person depending on their symptoms.

Issues about the technology were raised with the MHRA by an NHS doctor who noticed the chatbot failing to correctly identify serious conditions, such as heart attacks, based on the symptoms he entered. The MHRA responded to the doctor, saying it shared his concerns. The app had previously been included on the NHS's approved list of healthcare apps in 2017, but was removed along with all “paid for” services a year later.

Babylon Health has said its product has passed several independent reviews and that it would continue to be open to working with regulators.

Austrian femtech firm secures £2.5m for UK expansion

Rohan Banerjee

Half a year after its launch in the UK, Breathe ilo, an Austrian fertility technology product, has secured £2.5m of funding to expand into the UK market. Breathe ilo is a handheld breath analysis device that uses a woman's CO₂ saturation levels to track her most fertile days. The company has attracted investment led by AWS Gründerfonds, one of the largest Austrian venture capital funds, with a view to expanding its market across

Europe. The UK fertility sector is estimated to be worth around £320m, and Breathe ilo has overseen a dramatic increase in its sales and subscriptions month-on-month since its launch in September 2020.

The company's founders, Dr Ludwig Wildt and Dr Horst R  ther, have said that the business is committed to helping British women improve their chances of having a child. Breathe ilo reinvests half of its sales price into medical research around pregnancy and women's menstrual cycles.



Surrey hospital benefits from surgical robots

Rohan Banerjee

Last year, approximately 600 patients with cancer and other serious conditions at the Royal Surrey Hospital were treated using state-of-the-art robotic surgery technology. The robots, mainly used for the removal of lymph nodes or cells in treating breast, bladder, prostate and cervical cancers, have helped surgeons to carry out their operations with greater precision.

Matthew Perry, clinical director of urology at the Royal Surrey NHS Foundation Trust, said in a statement: "The new robots are a great addition to the trust and will facilitate faster

recovery times for our surgical and cancer patients. The robots allow us to have a better view of the surgery, thanks to their high-definition, three-dimensional cameras, and have many benefits for patients and staff."

Perry added that recovery times for patients following robot-aided surgery were often "halved" while the more precise incisions could also lead to reduced blood loss for patients, but he noted it would still be a long while until robots conduct operations "solo". For now, they will continue to be "used in conjunction with a human", he said.

The Royal Surrey Hospital has been using surgical robots in gynaecology and urology since 2009.

UK government launches tech talent scheme

Samir Jeraj

The UK government is looking to attract top tech leaders to join the Civil Service to work on digital challenges facing the public sector, including Covid-19. The No.10 Innovation Fellowship programme, modelled on a similar scheme in the US, is being supported by Number 10, the Cabinet Office and the Government Digital Service. Ten fellows will be recruited each year to work on applying digital technologies to issues including health, education and criminal justice.

The healthcare project will involve working with the Department of Health and Social Care to design "high-impact data solutions" for tackling Covid-19. The scheme will be supported by a board made up of tech leaders across government, academia and industry.

Joanna Davinson, the chair of the advisory board, said "It's essential that we have the right technical skills and experience within the digital, data and technology (DDaT) profession to deliver the best public services."



"Zoom fatigue" poses health risk to home-workers

Rohan Banerjee

"Zoom fatigue" – tiredness caused by excessive videoconferencing – has emerged as a common health risk for people working from home during the lockdown measures against the Covid-19 pandemic. According to a study, *Non-verbal Overload: A Theoretical Argument for the Causes of Zoom Fatigue*, carried out by Jeremy Bailenson, professor of communication at Stanford University in California, there are four main reasons why video calls sap people's energy. These are the massive strain of close-up eye contact, seeing oneself on a screen, extended period of sitting still, and people's brains having to work harder to send and receive signals.

The study also refers to a "hyper-aroused state" that usually only occurs when people are very close to each other, during moments of physical intimacy or conflict, for example. The study recommends making chat windows smaller, sitting further away from the screen, or turning off cameras to minimise the risk of fatigue. ●

A health service fit for the future



The pandemic has boosted tech uptake in healthcare, and policy must keep pace with that change, says Innovation Minister James Bethell

The coronavirus pandemic has taught us that the proper use of technology is not to simply make things easier for patients or clinicians. It is about saving lives – pure and simple. That is why we have made so much progress on tech – because it went from being “nice to have” to “mission-critical”.

When the country’s GP surgeries are shut, you have to stand up a national telemedicine solution. When wards are full and clinicians stretched to capacity, you have stand up an at-home oximeter solution. When you need hundreds of thousands of Covid-19 tests a day, you have to build a new diagnostic infrastructure. When you have to recruit 4,000 Covid-19 patients to clinical trials through primary care, even though the GP surgeries are shut, you have to stand up a patient-facing recruitment platform. When you ask the elderly and vulnerable to isolate for months, you have to distribute IT and iPads to low-tech care homes so they can reach their loved ones.

We are not pausing for breath. The NHS bill is a statement of our intent:

technological innovation will play a central role in the radical evolution of our late-stage, acute healthcare system into an early-stage, preventive system because it helps us to save lives. The foundations for this transformation are already clear to see. Data and technology innovations are driving vital improvements to patient safety, whether it is deploying digital systems that monitor cardiac patients’ heart rate and blood pressure and connect with clinicians through virtual appointments, or by setting up safe, virtual Covid-19 wards to help manage patients safely at home.

We have also been able to reduce the chance of cancer being missed in women and the delays that put lives at risk by using AI to solve critical challenges in the NHS Breast Screening Programme. At the heart of all this innovation is patient safety, with technology pre-empting harm, designing out the scope for human error, and connecting patients to the care they need when they need it. This is a pivotal, life-saving change that is taking place when our health and care system is under huge pressure.



Data can save and enhance people's lives

GETTY IMAGES/JEFF MITCHELL

For me, the most vivid example of where tech has made a difference during the pandemic is in the shift from GP face-to-face appointments to videoconferencing, at a time when we were trying to limit the amount of face-to-face contacts. We have now fired up the NHS's capability for remote consultations. Since March 2020 there have been 2.5 million consultations, totalling 1.1 million hours, through the NHS's Attend Anywhere video service. Where appropriate, people no longer have to go into their GP surgeries or hospitals for routine conversations that can be done online or over the phone, ensuring safer lines of communication between patients and doctors and reducing the spread of the virus.

It has been extremely heartening to see patients being increasingly put at the centre of their own care and their own journey and choices, and giving them access to information and their own data. From a place where patient data was very much something for the clinician to keep to themselves we are working to bring patients into the driving seat, and with this comes all sorts of potential benefits and advantages. For example, it promotes safer record-keeping, allowing patients to identify and correct mistakes in their data that otherwise simply wouldn't be spotted. If done well, this process should help reduce errors, be enormously helpful, and empowering.

Clinicians have also led the way in showing how healthcare can be delivered differently. More and more services are provided to patients in their own homes. For the first time, hundreds of thousands of patients are being given pulse oximeters to use at home under clinical supervision. And evidence is already demonstrating the patient safety benefits of this approach. By encouraging patients to use these portable devices to identify where oxygen levels are dangerously low, and then upload their data directly to their clinical teams, they can be monitored remotely in "virtual wards" without the need for lengthy hospital stays.

Perhaps the most critical change during the pandemic has been around the use of data, which has played a key role in terms of leaders managing the crisis, and, in terms of direct care, in looking after patients. We have simplified our guidance on how doctors and nurses share information with patients, and NHS staff have told me how liberating it is to know they can focus on their patients and not the complex web of information governance rules.

The NHS data platform, developed by NHS England and Improvement and NHSX in collaboration with partners, is currently giving local and national health leaders the real-time information they need to help tackle the coronavirus and direct resources to where they are needed most. The data platform also underpins the vaccination programme and allows NHS staff to track and organise vaccinations across different geographies and cohorts. This has been invaluable in managing the national vaccine supply chain and it will continue driving improvements long into the future.

But it has not all been smooth sailing. We learnt a lot from the early phases of the NHS Test and Trace app, which allowed us to improve the security and privacy of the product and win the hearts and minds of the nation, which ultimately allowed it to launch to great success. Likewise, there have been issues with health bodies using antiquated IT for testing data, but when problems arise they are fixed, and NHS Digital and its partners' digital infrastructure is now able to process 6.3 million test results a day.

We are now seeing a real sense of mission around creating a legacy for technology in healthcare going forward and meeting a generational challenge. The NHS bill aims to build on this extensive progress seen during the pandemic by continuing to enable hospitals, primary care and social care to innovate, integrate and harness new technology to improve people's lives. ●

Dispatches from the pandemic

The coronavirus crisis has accelerated the adoption of digital technologies, but there are still obstacles to overcome, says **Dr Subashini M**, associate clinical director, Aviva UK Health & Protection

IN ASSOCIATION WITH



Founded in 1797, as Norwich Union, our people have been there for our customers through several national crises. With experience comes insight. As an insurer offering a wide range of products to support a variety of customer needs, we've seen how many different aspects of people's lives have been disrupted by Covid-19.

Health is not simply the absence of disease but a state of living life to its full potential. It is well established that wider determinants of health have as much of an impact on an individual as factors we would consider to be within the remit of traditional healthcare providers. When we consider the wider determinants of health, from an insurer's perspective, we identified 3 cross-cutting themes:

Digital

The adoption of digital technology by organisations and acceptance of digital by individuals has been accelerated by the pandemic. It is difficult to see how we would have got through the past year without technology. It has become an enabler for our mental wellbeing. It has helped keep teams connected while working from home and helped families stay in touch with loved ones.

Necessity is often said to be the mother of invention, but in the case of digital health, necessity has been the catalyst for the adoption of digital solutions that have been with us for a

long time. In a pandemic, the provision of remote support reduces the risk of infection. In normal times, it saves travel costs, travel time and reduces carbon footprints.

In May 2019, NHS England reported roughly 95 per cent of GP appointments were carried out face-to-face before Covid-19. In June 2020, it was estimated that 85 per cent of consultations were carried out remotely.

Technology has also enabled the medical profession to continue to support their patients while helping to keep patients safe. Consultations and therapies such as physiotherapy and counselling are now more readily available virtually. Now, it's about finding the right balance between digital and face-to-face interactions.

While the adoption of new technologies has been swift, sustainable use of these solutions can only be fulfilled if the whole system is re-designed to enable digital ways of working. Simply using digital solutions as a substitute for an interaction is insufficient to get the full benefit from a digital approach.

Data

Data science has played an instrumental role in the pandemic response. We have seen the deployment of digital apps to help track, trace, monitor and control the spread of the virus. Data has supported the roll-out of our vaccination programme and is helping build a picture of both the short and long-term impact of coronavirus on the nation's health.

Data also has shown the disparities

Health is a state of living life to its full potential



in how we are experiencing the pandemic. Some groups have been affected more than others, and data has identified which segments of society need more support in improving access to healthcare and increasing vaccine confidence.

The far-ranging individual responses to the virus have shown there is no one-size-fits-all in healthcare. One of the key benefits of digital technology is the ability to use data to continually improve the patient experience. By learning about individual's preferences patient's healthcare experiences can be tailored to individual needs.

Despite the many success stories, a recent report suggested that many of the health apps available today do not meet the clinical standards set out by the NHS. There are various reasons for this, including lack of clinical input and potential security issues. Ultimately, this means that they could put the user at risk.

Moreover, people need to be confident that their data is being stored and shared securely to build trust, but we must also be mindful of digital exclusion. Healthcare needs to be inclusive, but access to technology and data literacy are not equally distributed.

Duty

Covid-19 has raised awareness of the dangers of conditions such as diabetes, obesity and heart disease. Many of these conditions are preventable with the right awareness and wellbeing support in place.

Wellbeing is a social issue that involves government, primary care providers, the food industry, employers and individuals themselves. Duty of care does not lie solely with the individual alone, nor solely with the healthcare system; it is a collective duty that we owe to each other.

An effective way to reach a large proportion of the population is through employer workplace wellbeing

schemes. In challenging times, wellbeing moves up the agenda. But some employers may be conflicted between providing wellbeing services and saving money. Often available at no additional charge to the whole workplace population and not just the insured community, wellbeing apps can help meet this need while also providing the ongoing engagement support that is so essential.

The impacts of increased usage of credible wellbeing apps are far reaching. Designed to educate and empower individuals to look after their health, wellbeing apps can also help improve health literacy and target inequalities.

However, it is not just about providing an app. Workplace wellbeing needs to be integrated into the culture of the company and supported by initiatives that foster social wellbeing. Now is the time to move away from seeing workplace wellbeing as a "tick box" exercise and look to encourage long-term behavioural change.

With the right strategy in place, workforces are likely to be more motivated and productive. Many of the comorbidities which have contributed to the significant loss of life during the pandemic could be prevented, helping control the financial burden of ill health on society.

The pandemic has demonstrated that while we may all be weathering the same storm we are doing so in different boats. Inequality has been exacerbated, and if action is not taken, we will be resetting to a new normal in which the iniquities of the old normal are replicated and amplified.

There is great potential in digital technology and data-driven approaches. Both can help reach more individuals who have previously been underserved. It is our collective duty to continue to democratise healthcare and enhance people-centred health systems.

The pandemic has shown us what we can achieve, but it also has shown us where we need to focus to improve. To quote Maya Angelou, now that we know better, we need to do better. ●

Contact tracing apps: around the world

Mobile phone software is central to tracing and isolating cases of Covid-19. But how successful has it been? By [Jonny Ball](#) and [Michael Goodier](#)

The UK's NHS Covid-19 app has been downloaded to 21 million phones. Its main function uses Bluetooth to automatically detect proximity to those with confirmed cases of the virus. Users check in to shops, restaurants and pubs with a QR code. If someone who later tests positive checks into the same venue, other visitors may be notified to isolate. The app has sent 1.7 million exposure notifications to users since its September 2020 launch.

Measured by the proportion of the population that has the app installed on their phones, NHSX – the health service's digital transformation unit – has developed the seventh most popular coronavirus app in the world, just behind Australia and the top five nations listed on the map.

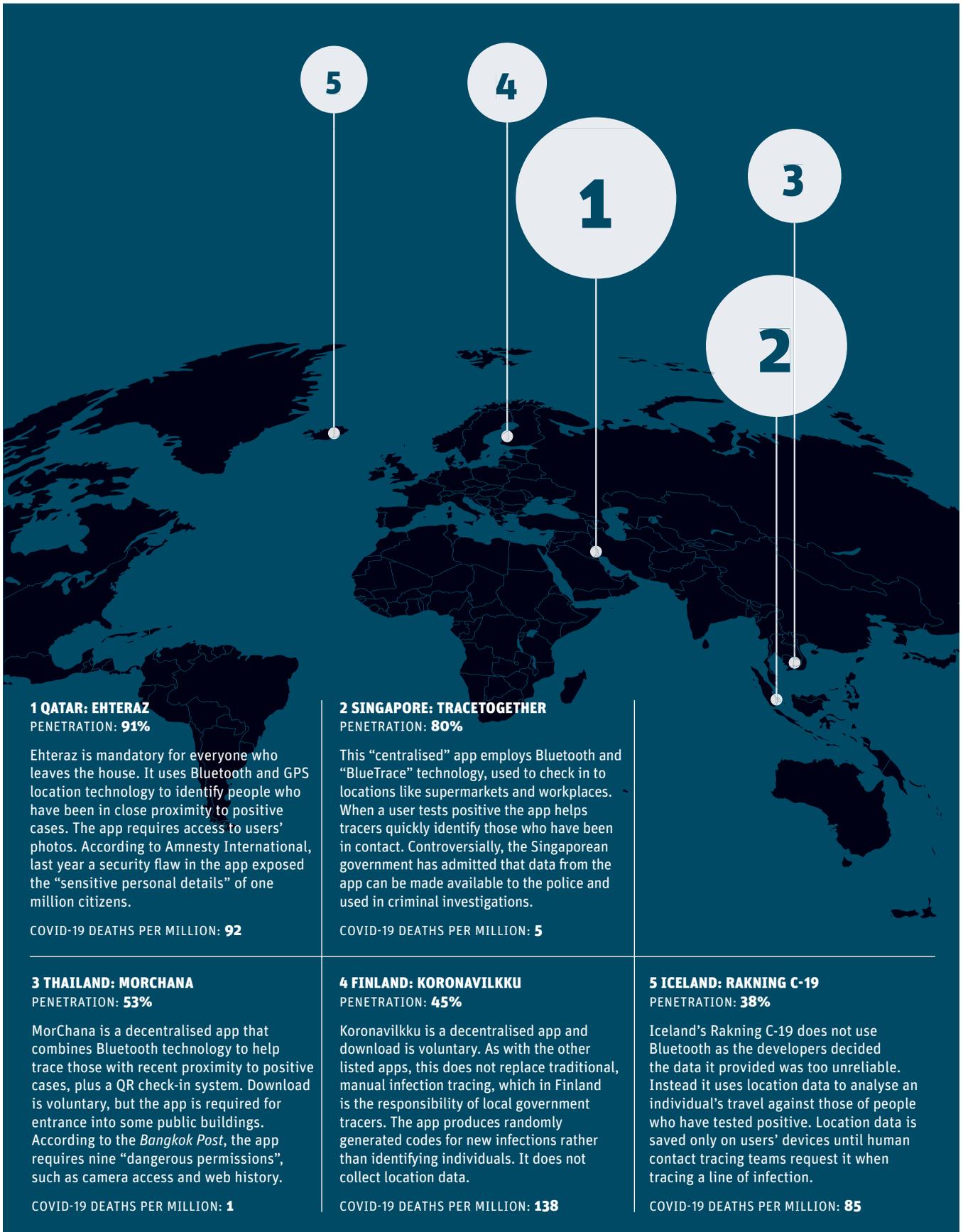
Despite this apparent success, however, Britain has suffered 125,000 coronavirus deaths – 1,859 deaths per million inhabitants, the fourth-highest per capita mortality rate in the world. Last week, parliament's Public Accounts Committee

reported that, despite the £37bn allocated to the UK's test and trace system over the next two years, there was "no clear impact" on reducing transmission. The system, administered by the National Institute for Health Protection, uses the app as a tool for thousands of volunteers and employees to manually trace the contacts of those who have tested positive.

The launch of the app itself was beset with difficulties as the government attempted to opt for a "centralised" platform, in which user data is stored on a central server. This raised privacy concerns, and Google and Apple both warned that this type of software would not be compatible with their systems. In one of several U-turns, in June 2020 – the tail end of the pandemic's first wave – the government switched to a "decentralised" model in which data is instead kept in individuals' phones. Apple had refused to waive its restrictions on the use of background Bluetooth until governments around the world adopted the firm's preferred decentralised approach.

All of the countries shown in our graphic have been fortunate enough to keep their coronavirus death rates comparatively low. But contact tracing apps are no panacea. Vietnam and New Zealand's apps have lower penetration than that of the UK, but each has recorded among the world's lowest Covid-19 deaths per head. Japan's app has been downloaded by only 6 per cent of the population, but the country has a lower death rate than any European country.

Apps aid manual, human contact tracing rather than replacing it. Mobile phone software is no substitute for strong, local public health infrastructures and adherence to social distancing, isolation and hygiene measures in high-trust societies. Once the pandemic has receded, apps will play a part in test, trace and isolate regimes that could help prevent a resurgence. No matter how high our faith in technology, however, they can only play one part in a necessary panoply of responses. ●



1 QATAR: EHTERAZ
PENETRATION: **91%**

Ehteraz is mandatory for everyone who leaves the house. It uses Bluetooth and GPS location technology to identify people who have been in close proximity to positive cases. The app requires access to users' photos. According to Amnesty International, last year a security flaw in the app exposed the "sensitive personal details" of one million citizens.

COVID-19 DEATHS PER MILLION: **92**

2 SINGAPORE: TRACETOGETHER
PENETRATION: **80%**

This "centralised" app employs Bluetooth and "BlueTrace" technology, used to check in to locations like supermarkets and workplaces. When a user tests positive the app helps tracers quickly identify those who have been in contact. Controversially, the Singaporean government has admitted that data from the app can be made available to the police and used in criminal investigations.

COVID-19 DEATHS PER MILLION: **5**

3 THAILAND: MORCHANA
PENETRATION: **53%**

MorChana is a decentralised app that combines Bluetooth technology to help trace those with recent proximity to positive cases, plus a QR check-in system. Download is voluntary, but the app is required for entrance into some public buildings. According to the *Bangkok Post*, the app requires nine "dangerous permissions", such as camera access and web history.

COVID-19 DEATHS PER MILLION: **1**

4 FINLAND: KORONAVILKKU
PENETRATION: **45%**

Koronavilkku is a decentralised app and download is voluntary. As with the other listed apps, this does not replace traditional, manual infection tracing, which in Finland is the responsibility of local government tracers. The app produces randomly generated codes for new infections rather than identifying individuals. It does not collect location data.

COVID-19 DEATHS PER MILLION: **138**

5 ICELAND: RAKNING C-19
PENETRATION: **38%**

Iceland's Rakning C-19 does not use Bluetooth as the developers decided the data it provided was too unreliable. Instead it uses location data to analyse an individual's travel against those of people who have tested positive. Location data is saved only on users' devices until human contact tracing teams request it when tracing a line of infection.

COVID-19 DEATHS PER MILLION: **85**

The government should pause before embarking on disruptive NHS reform, says **Jonathan Ashworth**, Shadow Secretary of State for Health and Social Care

Now is not the time for top-down reorganisation



The acute pressure of the coronavirus pandemic is starting to ease, but our NHS is clearly facing huge challenges. We need new, creative problem-solving to protect the healthcare system and innovation has a strong role to play. Luckily, one of the lessons of Covid-19 is that the NHS is more than able to rapidly innovate.

This should be no surprise. Throughout its history the NHS has been at the forefront of innovation. But what has been remarkable this past year is the way innovation has sped up. In the face of the biggest public health crisis in living memory, the NHS has pulled together to produce some incredible results.

We have seen the NHS contribute to life-saving research, finding new drugs, vaccines and care pathways that have given us a fighting chance against this virus. Millions of people around the world will benefit from findings made

possible by joint working between scientists, researchers, patients and NHS staff. It should be a source of immense national pride.

We have also seen digital innovations rapidly mainstreamed – from remote consultations to expanded use of NHS 111, to new tools for patients to manage their own conditions and symptoms. These have some clear benefits, like convenience for patients and fewer unnecessary trips to A&E. But improvements haven't only been top-down. Different innovations have developed around the country, as areas were given flexibility to trial the use of locally relevant solutions to problems the pandemic had caused.

There has also been a huge growth in new patient-led digital networks, such as WhatsApp groups for people experiencing particular conditions. These have provided support and connection when it's been impossible

for people to meet in person. The speed and scale of progress during the pandemic is remarkable. I fully support any effort to continue this rapid adoption and diffusion of innovation to prevent suffering and save lives.

While the pandemic has shown we can move faster in health innovation, it has also demonstrated the depth of health inequality in the UK. Now more than ever, the government and the NHS cannot afford to leave anyone behind.

Tech-driven healthcare has serious risks around inequality. Digital exclusion is a major challenge – around nine million people in the UK are unable to use the internet or their digital device by themselves. And 16 per cent of the population aged 16 and above simply do not have access to a smartphone. It is still an expensive luxury for many. And for some people, a digital consultation just won't be good enough. Patients with complex care needs and multiple



NHS workers in Stockton-on-Tees hold a doorstep clap in memory of Tom Moore



Digital exclusion is big a challenge

GETTY IMAGES/IAN FORSYTH

conditions are unlikely to see increased quality or convenience of care from a five-minute phone call. Digital consultations can also add pressure to hard-working doctors, who are asked to make rapid and important clinical assessments without face-to-face meetings.

It is essential that the expansion of digital healthcare ensures services are flexible enough to provide quality, accessible care to those without the skills or technology to engage with the internet. The government also needs to think more about which patient groups would be disadvantaged by digital-first care. Without these considerations, there's a real danger that over-reliance on digital services could exacerbate inequalities.

As well as the NHS's ability to embrace innovation, the pandemic has demonstrated the huge benefits to be found when the NHS, social care,

local government and wider partners collaborate. We have known for a long time that joined-up services are better for patients, but the crisis of the pandemic rapidly expanded partnership working for the benefit of patients and communities. Now, the government says its recently announced plans for a major structural reorganisation of the NHS aim to promote more integrated working across the health and care system. But the scale of the challenges facing health and care is immense. We are still deep within the biggest public health crisis that the NHS has ever faced. Staff on the front line are exhausted and underpaid and are now delivering the largest vaccination programme in living memory. Shockingly, over 220,000 people have been waiting more than a year for hospital treatment – 130 times higher than before the pandemic. There is also a deepening workforce crisis and huge uncertainty in long-term funding.

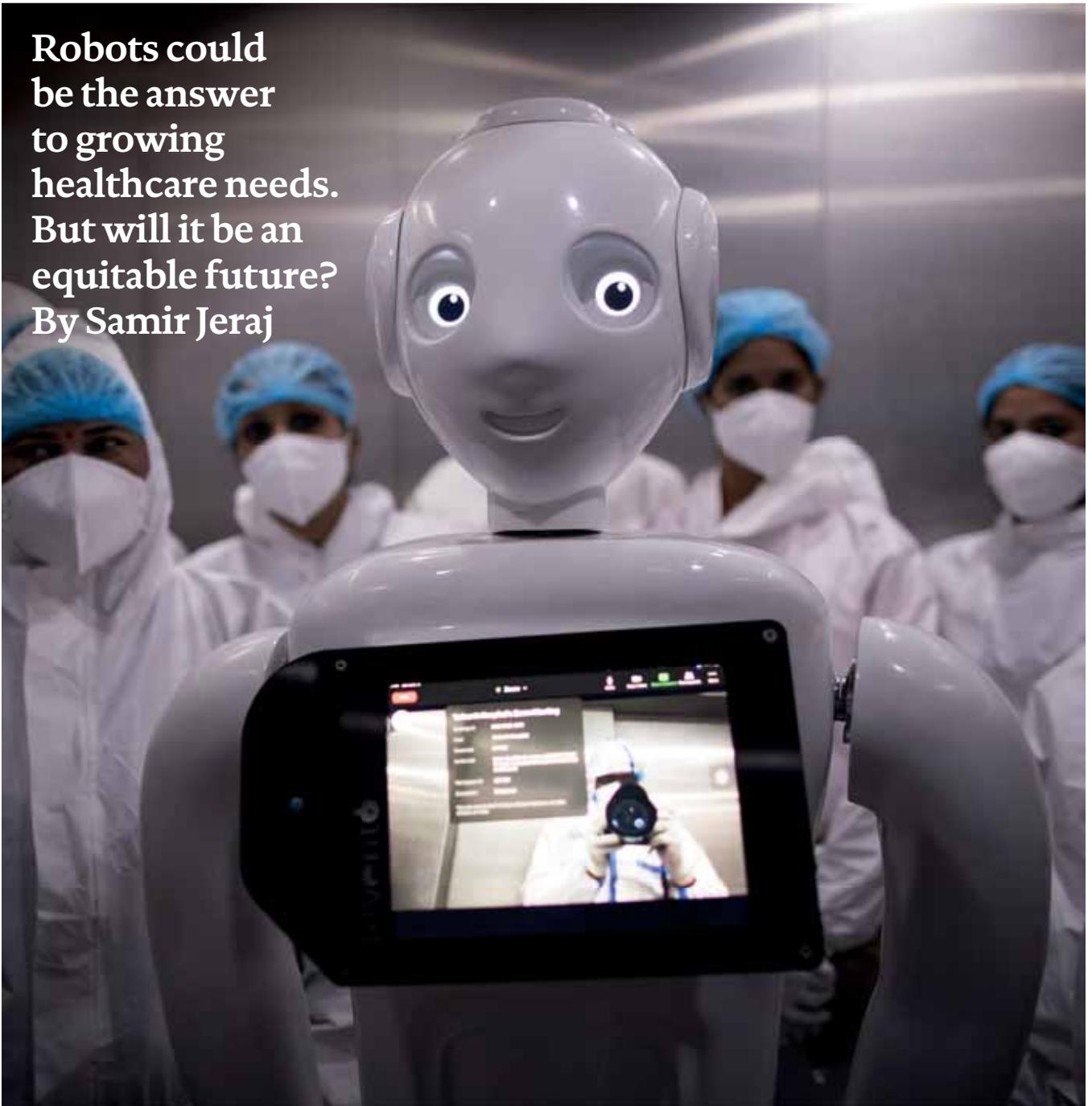
So, while joined-up care and partnership working can only be a good thing, it is just not realistic to now embark upon another structural reorganisation of the NHS. The timing of the proposed reforms is ill-judged and risky, but it's not surprising that the government has come to realise it needs to change NHS legislation.

The structure put in place by David Cameron's top-down reorganisation of the NHS in 2012 was never fit for purpose. The reforms promised reduced bureaucracy and improved cancer survival rates, but instead demoralised staff, distracted clinicians, and wasted money. Even before the pandemic, the fragmented service we were left with was failing to deliver the co-ordinated care patients deserve.

Although we ought to support the NHS to embrace innovation (while ensuring this innovation does not exclude any patient in need), now is not the time for a massive reorganisation of health and care. When the challenges facing it are greater than ever, we cannot afford disruption and distraction in the NHS. ●

Automated assistance

Robots could be the answer to growing healthcare needs. But will it be an equitable future?
By Samir Jeraj



Christopher was at London's King's College Hospital receiving another round of treatment for lymphoma when he first heard about AV1, a robot developed by the organisation No Isolation. It was Christopher's A-Level year and he was determined to finish at least one of the three he was doing. AV1 could help him stay in touch with school, ensuring he did not become isolated while recovering at home.

With the help of the Chartwell Cancer Trust charity, Christopher got the robot. "It sat in the classroom at school and I had the software on my laptop," he says, which meant that from the hospital he could speak in lessons and participate with fellow students. "This was before Covid, so before online learning became a thing," he adds. "It was a really positive experience and a really positive tool."

Robot use in health and social care is on the rise, with the medical robot market predicted to grow to \$16bn by 2025. Robots are helping to perform surgery, connect young people to school, and tackle isolation among older people. But will the costs of robotic equipment open up inequalities between those who can afford the latest technology and those who cannot?

In 2019 *The Topol Review* looked at how the healthcare workforce needed to change to prepare for a digital future. At the end of that year, the government announced £34m in funding for research into care robots, saying they could "revolutionise" the system. In his report, however, Eric Topol of the Scripps Research Institute, noted that new technologies should "redress not reinforce inequalities". This issue was already starting to emerge with personal tech, such as Fitbits, which help people keep track of their fitness. In 2019 the Social Market Foundation called for these types of devices to be made available on prescription to ensure everyone who needed one could have access.

The evidence does show that robots can address health and social care needs that disproportionately affect poorer people, such as poor mental health. Chris Papadopoulos of the University of

Bedfordshire ran a study where Pepper, a humanoid robot, was trialled with people in care homes in the UK and Japan.

The project took an existing robot and programmed it with a much more sophisticated version of software designed to be "culturally competent and autonomous" so it could communicate as naturally as possible with frail, older adults, explains Papadopoulos. Pepper remembered and responded to the preferences of users, so a cricket fan, for example, would not be repeatedly asked about the football.

The Pepper robots in the care homes "significantly improved" the mental well-being of the older people who used them, according to data Papadopoulos and his team collected. They had expected that loneliness would increase, he says, but the impact was positive, while less significant than the impact on mental well-being. What was also interesting, Papadopoulos noted, was that those who took part became more positive about the use of robots in social care. He believes "social robotics" has the potential to help address health inequalities, but "only if leveraged in a fair and equitable way". For this to happen, governance and quality assurance standards are needed to "ensure that all people can access these technologies should they wish to".

Lynne Baillie works at Heriot-Watt University, which hosts the National Robotarium, a research and development facility for robotic and autonomous systems. The centre received £3m of the government's £34m investment into social care robots. Baillie has been working with Chest Heart & Stroke Scotland to see how robotics can support stroke survivors, and with a housing association on how robots can help in

Technologies should redress inequalities

responding to falls in the home.

One of the aims of the National Robotarium, she explains, is to convene robotics researchers, policymakers, clinicians and other stakeholders to help develop technology and have policy discussions at an early stage, instead of building tech in silos. Inequalities in access are also of concern for Baillie, who notes wealthier and more educated people tend to get better access to care. There needs to be research and action to ensure robotics are "accessible and available" to everyone as they come into wider use, she says.

Trust and security are also important considerations. Baillie and her team have been working with psychologists on these issues, as well as ensuring their own work is ethical and only collecting necessary data. "We want to make sure that we have privacy by design," she explains, citing issues with Alexa, Amazon's voice-activated assistant, collecting data on users.

Assistive robots are one step on from assistive technology, says Kathryn Smith of the Social Care Institute for Excellence (SCIE). She thinks both can be embraced as a "complementary addition in health and social care, but not replace human contact where that is needed".

Access to assistive technology has long been an issue in social care. Clenton Farquharson, one of SCIE's trustees, says that any new technology needs "a rights-based approach". As well as accessibility and usability, manufacturers and providers should also be mindful of making assumptions about users' needs, he says – particularly for marginalised groups. One of the reasons why these efforts could fall short, he explains, is that "the most marginalised are often not around the table".

There is great potential for robotics, together with people, to transform health and social care. As the population ages, they can help us lead lives of our choice. It seems inevitable that, as new technologies come onto the market, they will be used. Policymakers will need to make sure that they are available to those who need them. ●

People have accepted that their information is key to healthcare policy. Will that change after the pandemic?
By Katharine Swindells

The new social contract

The past year has redefined the public's relationship with data. Millions tuned in to watch government press conferences explaining case numbers and hospital admissions. Epidemiological phrases such as the R rate and "excess deaths" have become household terms.

The way data is shared between the NHS, government, local authorities and researchers has also been overhauled, spurred by the public's willingness to hand over personal information. But this new relationship was formed in the crucible of a crisis. How will the pandemic shape expectations for data quality and transparency going forward? Ultimately, will people care?

At the beginning of the pandemic, notes John Appleby, chief economist at health think tank the Nuffield Trust, the data published by the NHS was a far cry from what we now know and expect.

"There were some very basic numbers put up by Public Health England and NHS England on deaths," he says. "It was very crude stuff. It took them weeks to get the dashboard functioning properly – even showing trend data, data by region."

Since then, data-sharing between institutions has improved remarkably,

says Imperial College London university researchers Sarah Jones and Melanie Leis, who work on a Covid-19 behaviour tracker that has been used by governments and policymakers worldwide. While previously getting data from the government and the NHS often involved much red tape and bureaucracy, Covid-19 has made everything accelerate.

"The economic impact of Covid has driven urgency, in ways that we've never seen before, for health providers, policymakers and economists to work together and speak each other's language," Jones says. "All the formalities went out the window – in a good way – with the aim of co-operation being paramount, [and above] ego or formality."

Data has been integral to every aspect of the UK's pandemic response – from

We will increasingly debate ethics

helping supermarkets prioritise deliveries for those shielding, to researching and publicising key messages about Covid-19's disproportionate impact on different ethnic groups. The flow of communication about cases and deaths has been crucial in gaining public buy-in for lockdowns, and for the ongoing success of the vaccination programme.

The fact that much of the general public can now read a data dashboard means that people will be better equipped to ask data-based questions of the government.

Advocates will be able to use government data in their demands, says Leis: "Specific interest groups will know that they can go and find that data and look for it to make their cases. . . I think we're all more familiar with what's out there and we all know that it should be informing decision-making."

But will these new standards in the quality and transparency of data last? Appleby says that a lot of the lessons learned over the past year have been behind the scenes, such as increased data literacy among politicians. That won't be lost after the pandemic.

In terms of speed and efficiency, Appleby says we can't expect the pace



we have seen in Covid-19 research to be maintained across the entire health service. It is likely, however, that researchers and the public will have higher expectations.

“Waiting times data – we have the technology to produce real-time, online data, hour by hour for [an NHS] trust,” he says. “It’s been done in some other countries. Why aren’t we doing that?”

Some of the key learnings of the pandemic will likely have permanent effects, hopefully shedding new light on other public health issues.

“It took them quite a long time to get into gear publishing stuff around ethnicity, but I think everybody recognised how important that was,” says Appleby. “And now that doesn’t take extra time, it just takes somebody to press the right button, and we can now have more data series, which are breaking down the population into more useful and policy-relevant groups.”

In areas where data is not as comprehensive, such as mental health and community health services, it’s now more clear than ever where the gaps are. Researchers, journalists and the general public are likely to demand more comprehensive data

from government and health services going forward.

Whether public health data continues to be openly available is a matter of debate. This year’s great gains in quality and transparency were driven by an emergency, with visible real-time improvements. It remains to be seen just how much public appetite there is for data post-Covid. There are also questions about the extent to which people will happily give up their own information once the state of emergency is over.

Leis says once the public interest in healthcare dies down, debates around the privacy and ethics of data collection will become more prominent. Polling conducted in the summer by the National Data Guardian found that while three-quarters of people are happy with data-sharing under emergency circumstances

such as Covid-19, 70 per cent believe that, data-sharing should return to the status quo ante after the pandemic.

The main concern is with private companies. Research by the Centre for Data Ethics and Innovation (CDEI) found that while two-thirds of people would be comfortable with their local authority sharing their data with the NHS, and over half with the police, only 15 per cent would feel comfortable with the council selling their data to private companies. The CDEI says that if local authorities and healthcare providers want to keep using data as they have been this past year, increasing trust through strong regulation and governance is vital. Ultimately, ongoing improvements in healthcare data can’t happen without the buy-in of the public.

“I think what Covid-19 has done is... shown people how healthcare data can inform policy in a very real-time way,” says Leis. “But if it’s something further down the line, then people might not feel that immediate connection to the cause, and they might not think that the risk of something bad happening with their data is worth it.” ●

Katharine Swindells is a data reporter at the New Statesman Media Group

Data has been integral to the Covid response

Putting patients at the centre

Tom McDonald, the CEO of Clerkenwell Health, a British mental health start-up, explains how psychedelic-assisted therapy might hold the key to patient-centric treatment

Psychedelic medicines are at a turning point. Used in combination with structured talking therapies, these compounds are being trialled in the treatment of mental health conditions. Last year, for instance, UK regulators gave the green light for the first clinical trial of the use of the psychedelic drug dimethyltryptamine (DMT) to treat depression.

Interest in the sector is also at a peak, as the rate of investment is increasing. A growing number of researchers and companies are developing new drugs and treatments for serious mental health conditions.

To understand the trials and tribulations of this fledgling sector, we need to look at how the pharmaceutical industry has evolved over the past few decades and how the patient has faded from focus.

According to polling, Big Pharma is little trusted by the general public and can be found near the bottom of consumer trust indexes. Even the sector's successes in fighting Covid-19 have not altered public perceptions. This reputation is likely due to a number of scandals, from the opioid crisis in the US to the price-gouging of essential medicines for HIV and diabetes.

Most people working in pharmaceuticals truly care about patients, however. They want their treatments to make people better.



Many employees are clinicians, leading scientists and operators who have put the care of others first throughout their careers. The good faith of these individuals is undermined by the system that has developed around them.

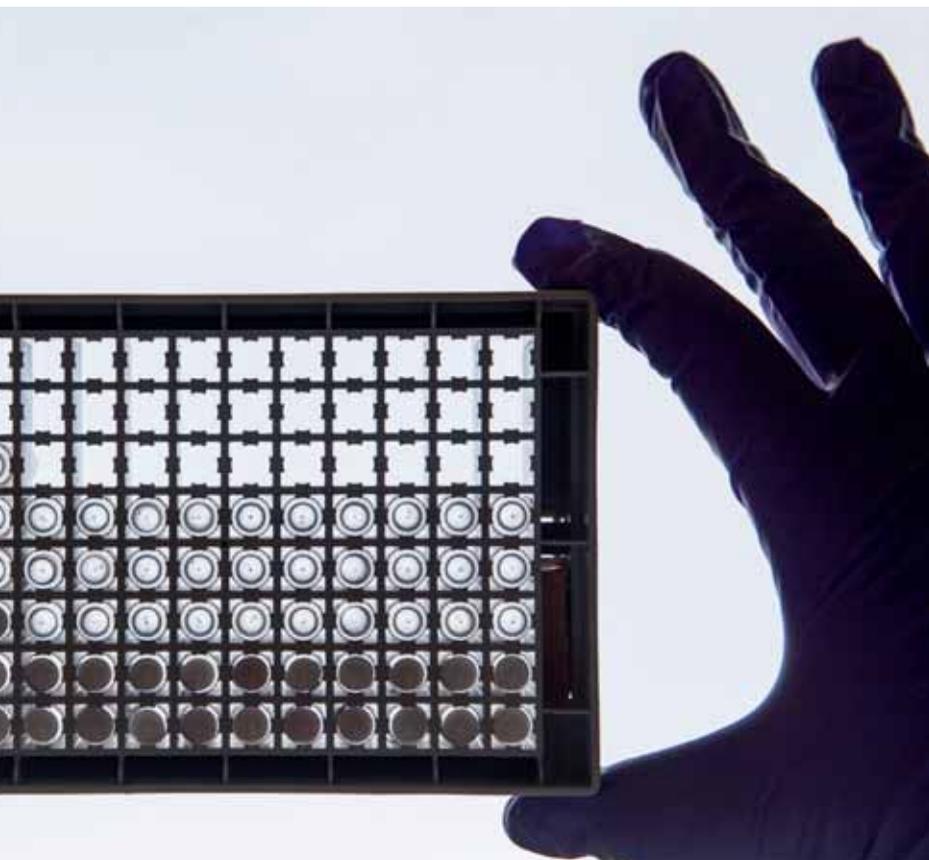
Over the past decade, the term “patient-centricity” has come into circulation, partly in an effort to counter the poor reputation of the system. It was, and still is, a popular buzzword. But what does it actually mean?

Put most simply, patient-centricity means putting the patient's needs and desires at the centre of everything you do.

Interest in psychedelic treatments is growing

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The pharmaceutical sector has been a net force for good over the past 150-plus years, but it was not built with patient-centricity as a foundational component. Pharmaceutical firms were built for profit, which drives competition and innovation. Any ideas, no matter how beneficial to the patient, are not widely adopted unless they improve the bottom line.

However, a glimmer of hope is on the horizon in the form of psychedelics. These chemicals gained significant traction among mental health researchers in the 1960s, but until the 2010s restrictive regulations slowed any major advancements. Now these drugs are attracting mainstream attention again as they move through phase 2 and 3 trials.

Based on these early-stage trial results, in the US the Food and Drug Administration (FDA) has classified some psychedelic drugs as having “breakthrough status”, while mental health issues are at an all-time high.

Now is the right time to build a new model for mental healthcare, one that puts patients at its centre.

One that will help provide people with lasting relief.

Psychedelic drugs are administered to patients in the hope that they may be able to view issues from a different perspective, and to use their experience to change patterns of thought or habit.

Talking therapy itself is the most important part of the treatment; psychedelic compounds are useful tools to enable this. How talking therapy is delivered, by whom, and when it is delivered should be carefully planned, with the patient’s journey starting long before they walk through the door of the clinic or hospital.

It is time for a new model of healthcare

The patient experience for psychedelic treatments starts with the first time they come into contact with the clinic, and continues until they receive the final treatment. The use of innovative technologies such as remote therapist consultations and patient-facing apps can help ensure the entire care pathway is tailored to the individual.

As with drug therapy in general, genetic testing could be used to identify genetic traits that allow a greater response to psychedelic treatments, as well as flagging those with a higher risk profile for adverse reactions.

It is well known that “set and setting” are vital to encouraging positive interactions with psychedelic medicines. Setting covers everything from the design of the room to the soundtrack a patient listens to, while set covers the patient’s own mindset toward the therapy, their expectations, hopes and fears.

When supporting patients in a fragile mind state it is vital to have the appropriate safeguards for those in positions of power. Therapists require clinical expertise, significant levels of compassion, and a great bedside manner. Confidence in the system as a whole could be derailed by just a few bad apples in the early stages of this industry.

Just as “set and setting” are important in the use of psychedelic medicines in mental health treatment, so is an awareness of the cultural and ethnographic history of these medicines. These important elements can be forgotten as a drug moves from the fringes to the mainstream. With psychedelics, one should pay heed to those like the Mazatec and pre-Columbian Meso-American cultures who built the anecdotal, cultural and sociological base of research that inspired much of today’s university and commercial research.

The world is evolving, and ethical, patient-centric healthcare is more important than ever. Psychedelics can play an important role in putting the patient back into the heart of mental healthcare. ●



IAN FORSYTH/GETTY IMAGES



Increased use of telehealth could help manage patient flow in hospitals and clinics

Clinicians discuss the digital revolution of treatment and services. By [Rohan Banerjee](#)

What front-line staff think of telehealth

Covid-19 has catalysed the adoption of telehealth. Last year, a report by Deloitte found that, as a result of the pandemic, 78 per cent of UK clinical organisations had increased their use of digital technologies to assist staff. Eighty per cent had implemented tech in order to boost remote patient engagement. “We’re basically witnessing ten years of change in one week,” Dr. Sam Wessely, a general practitioner based in London, told the *New York Times* last April.

The scope of telehealth is massive, spanning physical and mental health services. Some treatments are well-suited to remote arrangements, and there can be cost or time savings for both the healthcare provider and the patient who no longer has to travel to an appointment.

A 2019 study by Massachusetts General Hospital on the introduction of patient video visits for follow-up care found that 70.5 per cent of clinicians said they were better than office visits in terms of “timely scheduling”, and 52.5 per cent rated them better for efficiency.

But there are drawbacks, too, when it comes to accuracy of diagnosis, patient

satisfaction, and variations in the tech-savviness of patients and those treating them.

For Dr. Sreedhar Krishna, a consultant dermatologist based in London who works for both the NHS and in the private sector for the app Skindoc, the pandemic has created significant upheaval. “In my NHS practice, we have sought to limit footfall within the hospital,” he said in an email. “We have tried to make diagnoses based on telephone calls, where patients tell us the symptoms, as well as [via] video consultations.”

But the NHS systems that are used, Krishna says, are “outdated” and unable to replicate the insights afforded by an in-person visit. “Diagnosing a skin lesion as benign or malignant requires a high-quality still image rather than the blurred look that I can obtain via webcam,” he says.

Skindoc, an app which Krishna co-founded, uses the increasingly high-definition cameras attached to more modern smartphones. Users upload an image of their particular skin ailment to the app, and it is then assessed by one of

several clinical experts. “We review the image alongside the patient information provided and send medication through,” says Krishna. “We can [also] discuss the provided images via a video consultation and arrange for the medication to be delivered to the patient’s home.” He says Skindoc is being offered to the NHS departments to help “ease pressure” on over-burdened systems.

For all this innovation, though, Krishna is acutely aware of differing levels of technological know-how: “Many older people are not computer-literate, which has resulted in significant delays in both diagnosis and treatment.” There is a “delicate balance to be struck”, he warns, between the need to maintain social-distancing protocols, accurately diagnose problems, and give effective treatment.

Krishna expects telehealth is here to stay. “Patients like the fact that they are able to obtain a quick diagnosis and receive medications to their home without disrupting their entire day,” he says. But there will be some conditions or circumstances that will “always require face-to-face visits”.

Ali, a physiotherapist based in Manchester, says the pandemic has made his job more challenging: “You are limited to essentially [giving] advice, education and [recommending] exercise.” Although, he admits, around “80 per cent of what we do is advice and education anyway”.

The challenge, Ali says, is not necessarily in identifying injuries via telehealth, but rather in assessing the “extent” of the problem. He uses the example of differentiating between a sprain and a tear of someone’s Achilles tendon. There are “four different levels of sprain”, Ali explains, from mild to “complete rupture”. Grade 4 “would be quite obvious because somebody’s foot would be hanging down. You’d know the Achilles had completely snapped.”

Ali says that while the difference between grades 1 and 4 may be clear, the difference between 2 and 3 is less so. Remote treatments, he notes, will not necessarily give a physio a rounded



picture of exactly how much putting certain pressures on the injury hurts. And again, performing small exercises via Zoom is limited by camera quality, a person’s tech-savviness, or the reliability of an internet connection.

Nevertheless, Ali says telehealth “definitely” has a role to play in “triaging” patients. He notes the opportunity to see more patients digitally over the course of a day, discerning “which ones need emergency treatment, which ones need further investigation”. Some people, he says, will be invited in for a physical appointment if necessary, while those who do not require immediate treatment will not have to worry about disruption to their day.

Mental health services, specifically talking therapies, arguably lend themselves most conveniently to telehealth. But as with physical services there are problems, too. John-Paul Davies, a psychotherapist based in Surrey, currently sees 25 clients a week over Zoom and Teams calls. What he misses are physical cues. “Eighty to 90 per cent of communication is non-verbal,” he says.

Although he does not think the overall quality of the therapy sessions has diminished to the point where they are

Telehealth may help to triage patients

not helpful, Davies says you can tell a lot from “just the way somebody sits, the way they move in their chair”.

Prior to the pandemic, Davies only offered remote options to a handful of clients, some of whom had moved away and wanted to continue in his care. Post-lockdown he intends to return to face-to-face appointments as soon as possible, but he wants to retain the remote option for flexibility. “The people that come and see me, they may have half-an-hour drives,” he says. “Sometimes they enjoy the drive, they can think about whatever we’re talking about in therapy on the way there, or on the way back. And then other people, if they’ve got something else they would like to do, then they would rather just do it online that day.”

For Davies, the “main advantage” of telehealth has been the ability to continue seeing clients and start with new ones at a particularly challenging time for people’s mental health. Continuity of treatment during lockdown, he says, has been vitally important.

Davies also appreciates the market opportunities that remote therapy offers. Different treatments are now available to a wider range of people in many different areas. “We’re not limited by geography any more,” Davies says, as he notes that a client can seek out specialists according to their specific needs. “So for somebody to be able to speak to a therapist who is an hour and a half away, or even longer... I think that’s definitely going to be a thing that happens a lot more in the future.”

Choice and balance are the watchwords for telehealth. Technology has made treatment continuity possible at a time when it was really needed – people have not stopped suffering from other illnesses or injuries simply because of Covid-19 – but there are certain cases in which it is not a substitute.

Telehealth may be helpful in widening the range of treatments available and managing patient flow, but healthcare policymakers and practitioners will also need to be honest about the limits of virtual care. ●

Harnessing everyday innovation



Handheld and wearable tech can save and improve people's lives, says Dean Russell MP, chair of the All-Party Parliamentary Group on Digital Health

As we rightly applaud the roll-out of the Covid-19 vaccines, there is another significant achievement we must take notice of: the growing role of “digital health” across health and social care. The most obvious example of this is the rise in digital devices. Market leader Apple has sold over 100 million “watches” in just five years, and the latest models host a range of digital health options, from heart monitoring to an ECG app.

Such devices, unthinkable just a few years ago, have spawned a growth in health apps with services that give insights into personal healthcare that once were the domain of science fiction. *Nature* magazine stated a year ago that there were already 300,000 health apps, many of which focused on preventative healthcare – for example, smoking cessation.

However, apps are doing more than giving medical information; they are changing how healthcare professionals monitor, manage and reach patients, and shifting human behaviour too. A perfect example of this is the Good Smartphone Activated Medics (GoodSAM) app. Many people know GoodSAM for its incredible success in signing up an unprecedented 750,000 NHS volunteers during the first lockdown, but it is so much more than this.

GoodSAM is already used by emergency services around the world, providing an instant help platform for emergency dispatchers and urgent care call handlers to locate the caller

instantly and immediately open their smartphone camera. GoodSAM enables trained volunteers to provide a rapid response that saves lives. To illustrate this, in cardiac arrest, for example, if an individual has a heart attack on any street in the UK, the survival rate is approximately 9 per cent, but if they have a cardiac arrest at Heathrow Airport their survival rate leaps to 80 per cent. This is because there are more trained people nearby able to help them at a place like Heathrow Airport. The GoodSAM app means that wherever you are it is possible to quickly alert trained lifesavers nearby and increase the chance of survival.

This virtual approach to healthcare is not limited to apps. Across the UK, healthcare professionals are now routinely using remote telemedicine. For example, at West Herts Hospital Trust, its leading work on a “virtual hospital” model has enabled more than 3,600 people with Covid-19 to be looked after outside of the physical hospital. Not only does this mean patients have been able to be made comfortable in their own homes, but it has the added benefit of freeing up valuable NHS bed spaces on-site.

The trust's use of an app called Medopad has also enabled patients to enter data on their symptoms, temperature, heart rate, respiratory rate and the level of oxygen in the blood. Medopad automates the results and stratifies patients according to need, which means that the multidisciplinary team can focus on those patients that would most benefit from a call, or who may need a face-to-face appointment or even a diagnostic procedure.

Beating at the heart of all of these innovations is the need for a single-patient view that connects across health and social care. Currently, the patient experience isn't as seamless as it should be. By developing policies that connect the dots using technology across health and social care it could be possible to create patient experiences that transform healthcare for the next century and transform lives. ●

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