

FUTURE OF HEALTHCARE

08 HEALTHCARE'S
STAFFING PROBLEM

14 DOES PHARMA'S R&D
JUSTIFY ITS PRICES?

22 THE NHS: AN
INNOVATION FACTORY



The gift of time. How would you spend it?

We understand that time is your most critical asset.
So we're here to give it back.

www.blueprism.com

blueprism®

Today, precision medicine lacks precision ...and patients are suffering

Biomedical data holds the key, but it is trapped in silos across the globe.



Lifebit is creating a world where access to biomedical data will never again be an obstacle for curing diseases.

Securely connecting researchers with this sensitive data to enable faster diagnosis and more effective drugs.

Let's connect the world's data together and make tomorrow's medicine more precise for patients.

Learn more at lifebit.ai



Privacy & Security • Trusted Research Environments • Federated Analysis • Data Standardisation

FUTURE OF HEALTHCARE

Distributed in
THE TIMES

Contributors

Martin Barrow

Former health editor, news editor, foreign news editor and business news editor at *The Times*, specialising in the NHS and social care.

Alice Broster

Freelance journalist and have worked with *Bustle*, *BBC*, *Forbes*, *the Independent* and *HuffPost* over the last four years.

Danny Buckland

Award-winning health journalist, he writes for national newspapers and magazines, and blogs about health innovation and technology.

Rich McEachran

Freelance journalist covering the intersection of business, technology and sustainability for publications including *The Guardian* and *Wired*, as well as B2B titles.

Natalie Healey

A freelance journalist and editor with bylines in *Wired*, *Nature*, *Reader's Digest* and *Which?*. She writes about science, health and social care.

Charles Orton-Jones

PPA Business Journalist of the Year, former editor of *EuroBusiness*, specialising in fintech and high growth startups.

Julie Penfold

A freelance journalist specialising in healthcare, her work can be found in a range of consumer and trade titles.

Josh Sims

Journalist and editor contributing to a wide range of publications such as *Wallpaper*, *Spectator Life*, *Robb Report* and *Esquire*.

Jonathan Weinberg

Freelance journalist, writer and media consultant/trainer specialising in technology, business, social impact and the future of work and society.

Raconteur reports

Publishing manager

Sophie Freeman

Managing editor

Sarah Vizard

Deputy editor

Francesca Cassidy

Reports editor

Ian Deering

Sub-editors

Neil Cole

Gerrard Cowan

Head of production

Justyna O'Connell

Design and production assistant

Louis Nassé

Design

Pip Burrows

Celina Lucey

Colm McDermott

Nita Saroglou

Jack Woolrich

Sean Wyatt-Livesley

Illustration

Sara Gelfgren

Kellie Gerrard

Samuele Motta

Art director

Joanna Bird

Design director

Tim Whitlock

Although this publication is funded through advertising and sponsorship, all editorial is without bias and sponsored features are clearly labelled. For an upcoming schedule, partnership inquiries or feedback, please call +44 (0)20 3877 3800 or email info@raconteur.net. Raconteur is a leading publisher of special-interest content and research. Its publications and articles cover a wide range of topics, including business, finance, sustainability, healthcare, lifestyle and technology. Raconteur special reports are published exclusively in *The Times* and *The Sunday Times* as well as online at raconteur.net. The information contained in this publication has been obtained from sources the Proprietors believe to be correct. However, no legal liability can be accepted for any errors. No part of this publication may be reproduced without the prior consent of the Publisher. © Raconteur Media

[@raconteur](https://twitter.com/raconteur)

[/raconteur.net](https://facebook.com/raconteur.net)

[@raconteur_london](https://instagram.com/raconteur_london)

raconteur.net

/future-healthcare-2021-nov

REPUTATION

Even with funding boost, a bleak prognosis for NHS

The NHS got more money in the Autumn Budget, but will remain in a critical condition without a viable workforce plan

Martin Barrow

Can the NHS survive the pandemic? The question would have been unthinkable a few months ago. But with challenges ranging from daunting waiting lists to growing abuse of healthcare officials, the outlook is foreboding.

This is a momentous time for the organisation that has been responsible for the nation's health for more than 70 years. There's a huge backlog of care, with almost 6 million people waiting for treatment. The waiting list is rising by about 100,000 a month as more people who did not seek or could not access NHS treatment over the past 18 months visit a GP and are referred to hospital.

The number of patients waiting more than two years has risen to nearly 10,000. People who are seriously ill are unable to access the care and support they need, which puts their lives at risk. In many hospitals, ambulances are unable to unload patients because there's nowhere for them to go.

The weekly clapping for the NHS feels like a lifetime ago. Today, at the frontline of care, GPs have become the target of public anger and frustration over the challenges faced by the health service. Increasingly, healthcare professionals in hospitals and health centres face abuse from patients and their families.

Dr Katherine Henderson is a senior A&E consultant in London and president of the Royal College of Emergency Medicine, which represents A&E doctors. "It is a sad reality that in recent months there has been a rise in abuse directed towards healthcare workers, but this abuse is not something new to frontline staff or emergency departments," she says. "It was bad before the pandemic, but there's a changed atmosphere now."

Despite the talk of a "post-pandemic" world, the NHS is still struggling with a live coronavirus crisis. There are almost 9,000 people in hospital being treated for Covid-19. This takes up resources and requires isolation on wards, limiting admissions of other patients. There are fears this is likely to increase in the winter in the absence of measures like social distancing, compulsory face masks and working from home.

The cost of addressing these challenges is formidable. The chancellor of the exchequer, Rishi Sunak, set aside an extra £5.9bn for the NHS in his Autumn Budget in



October. The money is intended to help clear the record backlog of people waiting for tests and scans, which has been worsened by the pandemic, as well as to buy equipment and improve IT. This is in addition to the £12bn announced in September, to be raised through increases in National Insurance and, from 2022, the Health and Social Care Levy.

This is the biggest increase in core capital investment in health since 2010, according to the Treasury. Paul Johnson, director of the

Institute for Fiscal Studies, said the increases in departmental spending have "more in common with Blair and Brown than Cameron and Osborne". About 44% of the cash increases in the Autumn Budget will go on the NHS over the next three years, the IFS estimates.

However, many question if even this colossal amount will be enough, given the health sector's structural weaknesses – staff shortages, crumbling buildings, failing social care, lack of equipment and outdated technology. There are currently

around 100,000 vacancies across the NHS. Many staff are isolating because of Covid-19, putting further pressure on an already overstretched workforce.

"The significant increase in capital funding will help the NHS reduce the elective care backlog, carry out more tests, reduce health inequalities and contribute toward the NHS net-zero target," says Danny Mortimer, deputy chief executive of the NHS Confederation.

"But to ensure the extra money delivers for the public, a strong

WHAT SHOULD BE PRIORITY NUMBER ONE FOR THE NHS?

Public opinion on some of the biggest problems facing the NHS

45%

Lack of resources / investment

45%

Long waiting lists / times

35%

Lack of doctors and staff

Health Foundation, 2019

and supported NHS workforce is needed. This is why training and increasing the supply of doctors, nurses and other health and care professionals is so important at a time when public polling recognises that staffing is the biggest problem facing the NHS.”

According to Jeremy Hunt, the former health secretary, “the extra money for the NHS will unravel quickly if we do not train the extra doctors and nurses needed.”

At this critical juncture, the health service is being led by two people newly appointed to their roles. Former chancellor Sajid Javid became health secretary in June, succeeding Matt Hancock. Amanda Pritchard became chief executive of NHS England on 1 August, succeeding Sir Simon Stevens, who stepped down after more than seven years. Pritchard was previously chief operating officer for two years, having worked for the NHS for her entire career.

Together, Javid and Pritchard must navigate the health service through this most turbulent period. In an early sign of the difficulties they will face, Javid courted controversy with a £250m financial package for GPs, linked to measures to increase the number of face-to-face appointments with patients.

Under the new scheme GP practices will be told they must “respect preferences” for face-to-face appointments and should consider using the cash to extend opening hours and offer walk-in consultations to increase the availability of in-person consultations. Those failing to offer sufficient in-person appointments will be denied access to the fund.

Official figures show that 58% of GP appointments in England in August were face-to-face. Before the pandemic, 80% of appointments were carried out in person.

The package has caused anger among GPs, who say the investment falls short of what’s needed while failing to recognise the long hours they have worked to meet patients’ needs during the pandemic. The British Medical Association (BMA)

GP committee urged practices not to comply with “the very worst aspects” of the plan, including target-driven league tables. The committee also called on GPs to take steps towards industrial action.

Dr Richard Vautrey, the outgoing chair of the BMA’s GP committee, says GPs have no alternative but to take the action. “All efforts to persuade the government to introduce a workable plan that will bring immediate and longer-term improvement for doctors and their patients have so far come to nought.”

Part of the explanation for GPs’ anger can be traced to the beginning of the pandemic, when NHS policy – supported by the government – was to promote virtual services wherever possible. Digital First was adopted as policy and written into the NHS Long Term Plan, with incentives to invest in new technologies. The Department of Health and Social Care gave enthusiastic support to private digital pioneers like Babylon, which manages ‘GP at Hand’, the NHS’s app-based service.

Yet the adoption of technology, particularly around the remote delivery of care and support, is critical to the sustainability of the NHS, not just by GPs and primary care but across all services. Investment in technology is a clear focus of the new capital spending supported by the Treasury. Around £2.3bn of the additional funds promised by the chancellor are earmarked for investment in digital IT. There will be a

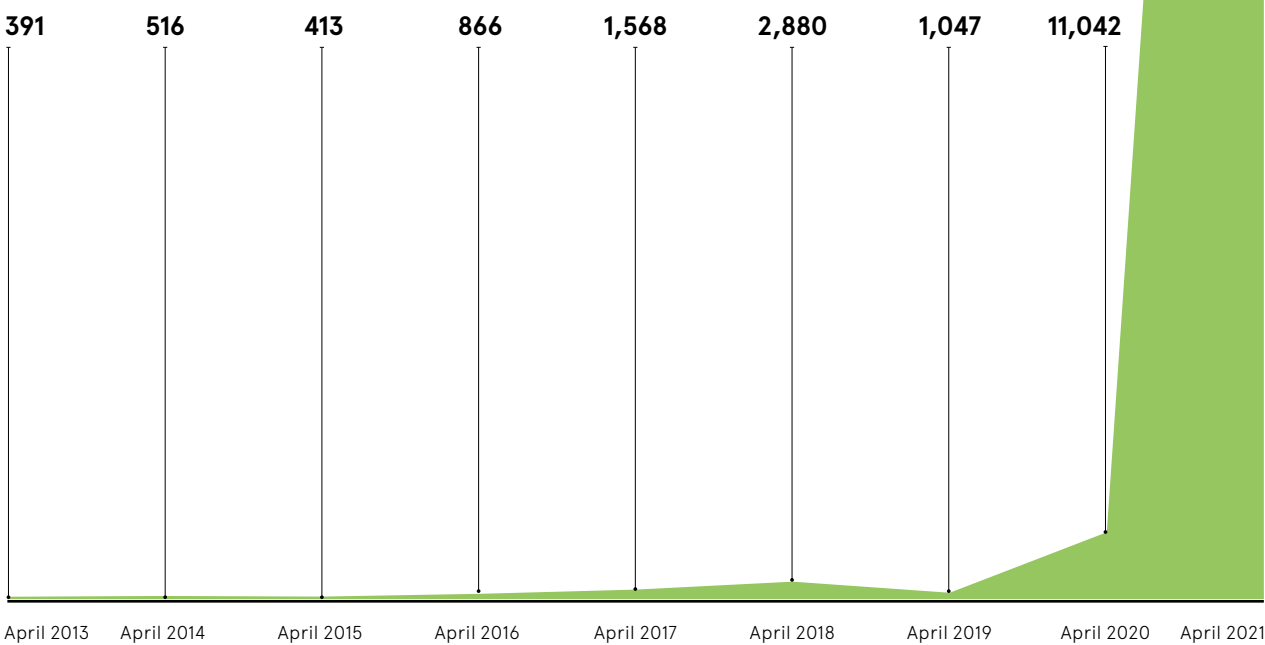
385,490

To truly meet the scale of the challenge over the longer term, government needs to shift the focus to creating the conditions that keep people healthy in the first place

COVID HAS LED TO INCREASED WAITING TIMES FOR TREATMENT

The King’s Fund, 2021

Number of NHS patients waiting more than 52 weeks from first referral to first treatment



The pandemic has made it clear that the entire system is built on a flawed infrastructure of insufficient and disconnected triage

particular focus on creating additional capacity for diagnostic tests, like CT, MRI and ultrasound scans.

Dr Murray Ellender, co-founder and CEO of eConsult, believes funding should be prioritised for digital triage, to give patients the most direct possible route to needed care.

“Cash injections like these may help ease the immediate blow. But our healthcare system requires a careful overhaul,” he says. “The pandemic has made it clear that the entire health system is built on a flawed infrastructure of insufficient and disconnected triage. If we don’t invest in this widespread change now, we not only face a bleak winter, but we may witness the ultimate breaking point for our NHS.”

In healthcare, digital infrastructure is about more than the interface with patients: it’s also about what goes on in back offices. Increasingly, automation is being implemented in areas like referrals. It helps ensure that patients are seen as efficiently as possible, validating their data on the waiting list so they’re set at the right priority and confirming that they still require care. Digital workers are completing similar processes to overcome the cancer care backlog by auditing key milestones across cancer pathways.

IT infrastructure must be an early priority for the integrated care system (ICS) concept if it is to deliver joined-up care. These systems bring together organisations across the NHS, local councils and the voluntary sector, who will need to share information to establish effective collaborative projects. This will mean creating common frameworks that somehow bring together the multiplicity of IT systems currently being used.

Guidance published by NHS England and NHS Improvement requires each ICS to have “smart digital and data platforms” in place by April 2022, when ICSs will be put on a statutory footing. By then, each ICS should have a senior executive with responsibility for governance and accountability for digital strategies.

Shared health and care records and cross-system data sharing will underpin the core purpose of ICSs, with an ambition for patient records to travel seamlessly from one provider to another without delay. However, putting this into practice across each ICS requires significant investment and careful planning to ensure that systems are effective and secure.

It’s easy to be cynical about the NHS and healthcare tech, given patients’ experience of lumbering IT in hospitals and GP surgeries. But there is another side, which includes world-leading genome sequencing

and the rapid development of the Covid-19 vaccine. The NHS App is currently the most downloaded free app in England. Users benefit from easier access to NHS services, including GP appointments and repeat prescriptions.

Barts Health NHS Trust Health Centre, the largest in the UK, uses a digital system that helps patients and clinicians connect through virtual appointments. The system captures biometric data, such as blood pressure and heart rate; healthcare professionals can intervene if needed by communicating directly with patients through the service. Patients also have access to data like medical documentation and clinical notes that supports the management of their long-term conditions at home.

But in its quest for a sustainable future, the NHS faces a challenge. It must find a way to harness the information it collects for the benefit of millions of patients and service users. As waiting lists continue to grow and the service struggles to recruit and retain the health and care professionals it desperately needs, this future cannot be taken for granted.

“To truly meet the scale of the challenge over the longer term, government needs to shift the focus to creating the conditions that keep people healthy in the first place,” says Charles Tallack, assistant director of the Research and Economic Analysis for the Long Term (REAL) Centre at the Health Foundation. “This means implementing a whole government approach that places improving health at the front and centre of all major policies.”

£5.9bn

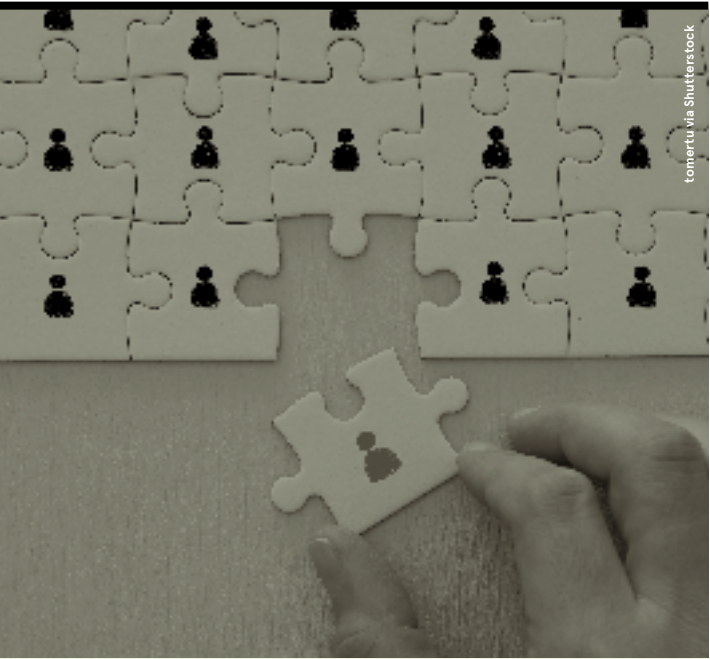
amount allocated to the NHS in October’s Autumn Budget, intended to reduce waiting times

BBC, 2021

£12bn

additional NHS funding to be raised annually through increases in National Insurance and the Health and Social Care Levy

The Guardian, 2021



NHS shake-up aims at joined-up care

Health and care services in England are undergoing their biggest reorganisation in a decade, thanks to the creation of integrated care systems (ICSs). These are partnerships that bring together providers and commissioners of NHS services across a geographical area with local authorities and voluntary organisations to collectively plan health and care services.

The main aim of ICSs is to integrate care across different organisations and settings, joining up hospital as well as community-based services, physical and mental health, and health and social care. The expectation that care standards would get a boost from competition among providers has been dropped in favour of collaboration. The ambition is to remove the barriers that often stand between patients or service users as they try to access the care and support they need.

All areas of England are now covered by one of the 42 ICSs. They have all appointed chairs and chief executives, while the Health and Care Bill currently before Parliament is expected to put ICSs on a legal footing by April 2022, with formal powers and governance structures. Existing clinical commissioning groups (CCGs), the groups of GPs previously responsible for commissioning services, will then be folded into ICSs.

Local leadership

There is not a blueprint for developing an ICS. In contrast to previous attempts at NHS reform, national NHS bodies have so far adopted a relatively permissive approach, allowing the design and implementation of ICSs to be locally led within a broad national framework. As a result, there are some key differences in the size of systems and the arrangements

they have put in place, as well as wide variation in the stage of development each system has reached.

A number of the ICSs are developing new models of care that benefit patients. In West Yorkshire and Harrogate, for example, almost 4,000 patients have avoided hospital appointments that were not needed and instead received specialist support while staying in primary care. This after three hospitals and 64 GP surgeries established a new Shared Referral Pathway. Surrey Heartlands ICS set up the Tech to Connect scheme with local partners, supporting digital literacy. Frimley Health and Care implemented schemes to bring rapid support to the most vulnerable communities during the pandemic, including Black, Asian and minority ethnic groups at greatest risk.

Widespread support

Will ICSs make a difference? While there is widespread support for joining up services across the NHS and broader collaboration with the local councils responsible for social care, there is still uncertainty about how this will be achieved in practice.

The BMA thinks the positive elements of CCGs – which include a strong clinical voice, local decision making and accountability to clinicians – must be kept in ICSs. In particular, it highlights the voice that CCGs have given GPs within local health and care systems.

Meanwhile, The King’s Fund think tank warns that evidence from previous attempts to integrate care indicates that these reforms will take time to deliver results. It also highlights that local and national leaders need to make a long-term commitment to change for the latest reforms to succeed.

Q&A Our decade of opportunity in healthcare



Recent scientific advances could transform healthcare by 2030, says Dr Hubert Bland, medical director at Bristol Myers Squibb UK & Ireland, but there are key decisions the UK must take to make that vision a reality.

Q How has digital technology helped improve healthcare over the past ten years?

A Extraordinary advances in healthcare over the past decade indicate an exciting future for all of us. Immunotherapy has transformed survival for some cancer patients; the rollout of an effective HPV vaccine has raised the prospect of eliminating cervical cancer as a global public health problem; and teams in the UK have sequenced 100,000 whole genomes¹ from NHS patients. The devastating Covid-19 pandemic, though deeply disruptive to health services in the immediate term, has acted as a further catalyst for the adoption of digital technologies. Within 24 hours of the Zoe app launching to track Covid symptoms in the UK, for example, it had been downloaded over 1 million times.² Such engagement in public health research is unprecedented and offers a window of opportunity.

Q How will data shape healthcare innovation over the next decade?

A By 2030, the way we deliver healthcare can be revolutionised even further, as science and technology converge, and the UK continues to embrace data-driven healthcare. In this new era of healthcare delivery, scientific developments are being leveraged to better understand the complexities of human biology.

Extraordinary advances in healthcare over the past decade indicate an exciting future for all of us

As such, our future healthcare will hopefully be based on early detection, faster diagnosis and better prediction of risk at both the individual and population level. Traditional healthcare data will be combined with other kinds of data to improve decision-making and better target health interventions. Prevention will be prioritised, enabled by the application of artificial intelligence algorithms, machine learning and digital devices.

Q What role is Bristol Myers Squibb playing in this healthcare revolution?

A As a pioneering bio-pharmaceutical company, Bristol Myers Squibb is particularly focused on the future of oncology and the potential for exponential improvements in our efforts against this disease. In cancer diagnosis, we believe that population-wide screening, leveraging new techniques and genomic and polygenic risk scores, will enable asymptomatic cancer detection and early diagnosis at stages 1 and 2 of the disease’s progression. Cutting-edge treatments used at these early stages of cancer will combine precision medicine with advanced therapies to make care more specialised and more personalised.

Q How can the UK ensure this vision translates to real-life advances in healthcare?

A By bringing together both traditional and non-traditional healthcare datasets, the UK could become the first country to routinely use AI in diagnostics, clinical decision-making and disease prevention. This must be done in the most robust, secure way, prioritising and protecting the privacy of people’s health records while unlocking the vast possibilities of large data to improve lives. We must also position the NHS as an engine of innovation, which means ensuring it gets the funding necessary to

clear the backlog caused by Covid-19 and lay strong foundations for the future. If we invest in NHS clinical research infrastructure and streamline approval processes, for example, the NHS can attract more clinical trials, meaning UK patients are among the first to test the most innovative treatments globally.

Q As the pace of scientific advances accelerates, how can the UK health system be more agile to proven innovations?

A This is a challenge for healthcare systems around the world, trying to grapple with unprecedented demand while continuing to advance patient treatment. The NHS, industry bodies and other partners must continue to work together – through initiatives like the Life Sciences Vision and Accelerated Access Collaborative – to expedite the adoption of new technologies across the health service. As we navigate this era of data-driven healthcare, we must also continue to put the individuals at the heart of decision-making about their own healthcare, the application of new technologies and the design of health systems. At Bristol Myers Squibb, we are committed to ensuring that the design of every major clinical trial of our medicines has patient input. Similarly, we must ensure that people’s needs define the future of every aspect of healthcare in the UK, so that all of us can share the benefits of longer, healthier lives.

For more information, visit www.bms.com/gb



¹ The UK has sequenced 100,000 whole genomes in the NHS. <https://www.genomicsengland.co.uk/the-uk-has-sequenced-100000-whole-genomes-in-the-nhs/> Last accessed: October 2021

² Professor’s coronavirus tracker app gets 1 million downloads in 48 hours, <https://www.nutraingredients.com/Article/2020/03/26/Professor-s-coronavirus-tracker-app-gets-1-million-downloads-in-48-hours>. Last accessed: October 2021



If you're looking at this advert, then your prospects are too.

Advertise with Raconteur in *The Times* and reach more senior business decision makers than any other national title.

Email enquiries@raconteur.net to learn more about our calendar of over 80 reports in *The Times*.

RACONTEUR



ARTIFICIAL INTELLIGENCE

Is AI science fiction or the future of medicine?

A range of projects are using artificial intelligence in healthcare, yet there are challenges around the technology and patient acceptance

Josh Sims

In Steven Spielberg's film *Minority Report*, police can predict who will commit a crime before it even happens. The idea that medicine could predict health threats has a similar touch of sci-fi – yet it's happening today.

As an example, Canada's Artemis Project provides insights into possible future heart attacks. In the US, the Vanderbilt University Medical Center has been able to identify people at risk of developing certain auto-immune diseases. There are many other such instances, all of which use machine learning and artificial intelligence (AI) to crunch data.

The world of medicine has long employed AI in making its diagnoses. The sector is an ideal candidate for the technology thanks to healthcare's data tsunami, the vast majority from imaging technology.

But recent years have seen rapid progress. Barely a week passes without some new study suggesting AI is on a par with or even outperforms medical specialists in their diagnoses, through its talent for pattern recognition. As part of a project with London's Moorfields Eye Hospital, Google's DeepMind can now recommend the correct referral decision for over 50 eye diseases with 94% accuracy.

Critically, AI performs its tasks much faster than humans. It's also

cheaper and presents less of a burden on typically stretched healthcare resources. And as doctors grapple with the chaos of a dynamic situation, AI diagnosis will likely lower the risk of medical misdiagnosis, too.

Many of us might struggle with the notion of putting our health in the hands of a computer. However, "the pandemic has had a major impact on acceptance," reckons Haider Raza, lecturer in computer science at the University of Essex, who's developing a proof-of-concept system for skin cancer detection and analysis using smartphone photographs.

Raza started his project before the pandemic and had to convince people to get involved. Today, "people are signing up for self-referral, because Covid has shown them how so much healthcare can be managed online."

That's just as well, because healthcare tech is only going to play a greater role in our lives. As domestic medical devices – ever-smaller wearables like activity trackers, glucometers, smart inhalers, heart rate and blood pressure monitors – become more commonplace and connected in real time to the so-called internet of things, the potential could be revolutionary.

Yet AI may not be the silver bullet for medical diagnoses that it's sometimes made out to be.

"We're heading towards something good but there is still a lot of hype," according to Maarten Van Smeden, assistant professor of epidemiology at University Medical Centre, Utrecht.

A University of Birmingham study in 2019 found that most machine learning algorithms are on a par with doctors in assessing medical imaging. However, it concluded that of 20,530 studies on disease-detecting algorithms published since 2012, fewer than 1% were rigorous enough to be included in its study in the first place.

"If you need an AI model to make a diagnosis, ask why, because it probably means it's hard to make a diagnosis. The fact is that AI needs many high-quality data points to distinguish between those with a disease and those without, so it becomes a circular problem," says Van Smeden.

You wouldn't expect biased data to deliver fair predictions, but current AI development in healthcare isn't addressing that kind of ethical issue

THE USE OF AI IN HEALTHCARE IS SET TO GROW

value of the healthcare AI market in 2021

\$10.4bn

\$120.2bn

projected revenue forecast for the healthcare AI market in 2028

41.8%

projected compound annual growth rate of healthcare AI market, 2021 to 2028

Grand View Research, 2021

Shang-Ming Zhou, professor of e-health at the University of Plymouth, thinks we're only starting to grapple with the many issues revealed by the use of AI in medicine. The data sets are often smaller than might be hoped, due to issues around privacy, patient confidentiality and data ownership. What's more, various data sources may be inconsistent depending on how they're produced, potentially building problems into any AI model.

Data, like doctors, comes with its own biases. An algorithm trained on Caucasian population data may provide misdiagnoses for other ethnicities. Some diseases, the likes of sickle cell or Tay-Sachs, are shaped by ethnicity, others by geography.

"You wouldn't expect biased data to deliver fair predictions, but current AI development in healthcare isn't addressing that kind of ethical issue," says Zhou. Then there's the challenge of regulation, as no current legal framework exists for data protection in private healthcare research.

"The other challenge is that the current AI model cannot generalise to a new population of patients or consider that healthcare practices evolve over time," he adds.

That's why talk of AI replacing human doctors – whose insights are born of experience and patient interactions – still seems far-fetched. "AI is a powerful tool, but a tool nonetheless," says Van Smeden.

The use of AI diagnosis by medical professionals could remain in the background, largely unknown to patients. But transparency will be key, argues Zhou, who's currently researching patient attitudes to AI. That's a problem, because AI's "thinking" is opaque in reaching its conclusions, which can be unacceptable for healthcare. This can allow unnoticed errors to become systemic faults; a bad model can end up harming patients.

"The conclusions AI reaches have to be fully explainable and interpretable," stresses Saurabh Johri, chief science officer at Babylon, a digital healthcare specialist. "A significant proportion of the populace is informed about data and open to being better informed as a result of its use. But what they still want to know is the value of that data and

“AI is a powerful tool, but a tool nonetheless

they can't without transparency.”

So why don't patients trust AI? It's not because they think it will fail to give a better diagnosis, says Zhou. Rather, it's "because the perception is that it can only provide standardised practice and treatment – it doesn't address the medical needs of the individual". Each person has a unique profile, but current AI is only suited for the "average" patient.

Other big questions must also be resolved. For example, does the use of AI in diagnoses challenge the authority of the clinician? Are its diagnoses aimed solely at extending life, possibly ignoring a patient's wishes to instead minimise suffering? Does it undermine the traditional doctor-patient decision-making process, and does this force doctors to align their standards with that of the algorithm, or to defer their decisions to it?

But progress is being made. The impact of machine learning in the health field will likely be profound, not just in treatment after diagnosis, but in heading off disease in the first place.

"If you want to diagnose a disease, of course that's fine, but if you want to treat a disease you need to understand how it develops. And nowadays we can measure what genes are expressed at the single-cell level and use machine learning to pinpoint what's important, what is driving a disease," explains Ziv Bar-Joseph, professor of computational biology at Carnegie Mellon School of Computer Science.

"We need machine learning for the DNA analysis that will allow us to understand which diseases people are predisposed to in the first place," he notes, adding that if we can deploy some of the AI-driven tests currently in development, "it will be amazing." ●

Second opinion: why NHS funds are being misallocated

With health and social care in the UK creaking under the strain, experts argue that money for structural upgrades must be redirected to tackle the sector's staffing crisis

Jonathan Weinberg

Debates about the future of the NHS are often dominated by calls for more investment in new technology to cure its debilitating symptoms. But many of the immediate problems facing front-line workers in the sector are not technological; they are human.

There have been well-documented shortages of nurses, GPs and other clinicians in recent years, exacerbated by factors such as Brexit and a wave of early retirements. This has since combined with the emergence of Covid-related job vacancies across the sector's wider ecosystem.

Calls for an urgent remedy have attracted billions of pounds in public investment, with the chancellor announcing further capex funding in his October budget. But, given that much of that money has been earmarked for new digital IT and diagnostic equipment, there is a growing belief that the recruitment and retention problem is still being ignored.

Richard Murray, CEO of the King's Fund, an independent charity working to improve health and social care in England, fears a future in which newly opened NHS facilities need to be mothballed owing to a lack of staff. He believes that successive administrations have ducked their responsibilities to the sector.

Murray suggests that the current government has "shown bravery" by increasing taxation to fund NHS investments and a long-term plan to reform social care (see boxout).

But he warns: "This all risks coming to nothing for one simple reason: there aren't enough employees. Even before Covid, the NHS was in the middle of a staffing crisis caused by a prolonged funding squeeze, combined with years of weak policy, poor workforce planning and fragmented responsibilities."

Murray notes that additional funding can't increase staff numbers by any significant extent, because those extra people simply "don't exist", although certain short-term measures such as an international recruitment drive could help to fill some of the more pressing vacancies.

A detailed plan is needed for workforce expansion, he stresses, and this entails "retaining and motivating as many existing employees as possible and investing in training to deliver the new staff of the future".

But Murray remains uncertain as to whether there's "any money left for such a plan. Tackling the workforce crisis is the biggest challenge by a country mile."

Rachel Hollis, chair of the Royal College of Nursing's professional nursing committee, also foresees problems if HR investments are not increased.

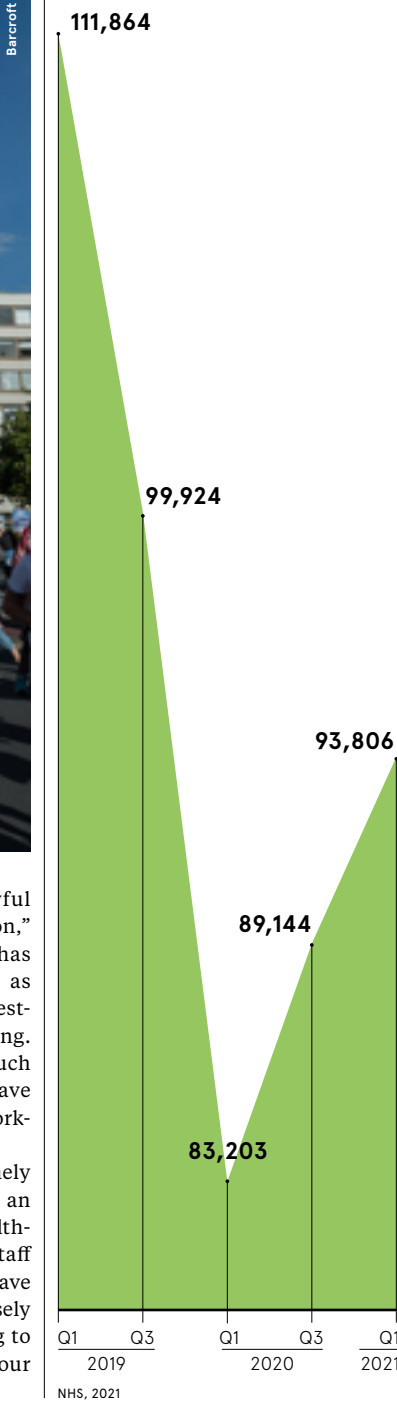
"In his recent budget, the chancellor set out investments in clinics, hospital beds and technology," she says. "All are welcome, but they do not replace years of under-investment in workforce planning. Technology will continue to evolve, but patients will benefit only if there are nurses to deploy it."

Hollis continues: "Nursing is a highly skilled and safety-critical profession, which requires significant investment. The NHS has tens of thousands of nursing vacancies and there are even more in social care. No amount of technology will prevent a knife-edge winter for health and care services. Human resources are the greater priority."

As CEO of doctor-led campaigning organisation EveryDoctor, Dr Julia Patterson speaks for more than 1,700 members. She believes that the pandemic's effect on their ability to work



STAFF SHORTAGES AT THE FRONTLINE
Total number of vacancies in the NHS frontline workforce in England



effectively in several settings is a grave concern.

Patterson does acknowledge that investments in technology are necessary across the NHS, noting that it can sometimes be a struggle simply to find a working printer. But she fears that doctors' stress levels have become so high that their resilience is reaching its limit. This could exacerbate the sector's human problem unless there's a properly funded effort to improve their physical and mental wellbeing.

She would also like to see fairer increases in doctors' pay to account for increasing workloads and rising inflation, plus funding for new nursing bursaries to widen access to the profession.

"What I get from doctors an awful lot is their sense of exhaustion," Patterson reports. "Everyone has a level of resilience. It feels as though the government is testing that by pushing and pushing. Humans can absorb only so much pressure. This will definitely have ramifications on the NHS workforce in the longer term."

She continues: "We're extremely fortunate in the UK to have an excellent training system for health-care workers, but losing skilled staff later down the road after they have gained the expertise will adversely affect patient care. This is going to have a devastating effect on our health service." ●

Social care addresses its image problem

Social care is facing its own crisis, with issues such as overseas recruitment and the introduction of mandatory Covid vaccinations for some staff playing a big part in this.

But Richard Adams, the chief executive of eldercare provider Sears Healthcare, believes that the biggest contributing factor is the all too common view that work in the industry is of "low value and low status".

Adams, who runs three nursing homes in southern England, having started out in the late 1990s as a care assistant, says: "Until caring for older people is seen as a skilled role, recruitment will remain a real challenge. This issue is underpinned by a more deeply held view that health services, particularly hospitals, have greater societal value.

This is not only about pay, but also has to do with training, career frameworks and wider recognition that caring for people has the same value as healing."

Adams thinks that more must be done to publicise the positive outcomes that high-quality eldercare can achieve. "The more care is understood by the wider public, the more value has. People should be proud to say they are a carer or that they work in a care setting," he says.

Dementia care nursing is one of the other areas that's unable to attract the talent it needs, explains Paul Edwards, director of clinical services at charity Dementia UK. This is not helped by the fact that the specialism's "unique skill" is often downplayed in universities.

Perception problems also figure highly in the recruitment challenge, according to Tricia Nicoll, who is one of the main proponents of the #socialcarefuture campaign. Low salaries and short care visits play their part too.

Her two autistic children (who are now adults) have needed help across many areas of their lives over the years, and this now includes their college work and volunteering. Nicoll stresses that the people she employs as care workers for her son and daughter are highly skilled.

"We need to look beyond formal qualifications to judge people's skills and knowledge – and we need to pay at least a living wage," she says.

Shifting public perceptions of work in social care as simply a matter of helping older people to "get up, go to the toilet or eat" would also widen the base for recruitment, Nicoll believes.

She speaks of how she previously helped create a team of care workers to support people with learning disabilities. They were all former miners with "no experience of working in social care", Nicoll says. "But their big hearts and no-nonsense attitude made them perfect for the role."

Improving the health of the nation through data insights

The pandemic has made clear that intelligence derived from the analysis of patient data is at the heart of modern healthcare

The UK's vaccination programme is a fantastic example of how data science can deliver high-quality programmes," says Dr Shaun O'Hanlon, chief medical officer at EMIS, the technology company that pioneered the use of patient clinical records to improve outcomes. "Analysis of data underpinned risk profiling, shielding patients, logistics and delivering the vaccine. The programme's success wasn't a fluke, it was how you use data to drive health service changes."

Rebuilding health services

Because of the pandemic, NHS waiting lists are growing and look set to get larger and longer. But finding the patients most at risk and prioritising resources can have a positive impact on the backlog, as can recalibrating health services so patients are identified and diagnosed earlier, directed to care pathways and then monitored, says O'Hanlon.

Analysis of patient data collected securely with the appropriate GDPR-related approvals from primary care settings, offers the brightest hope for the NHS to deal with the backlog caused by the pandemic and the rising demand for services from an ageing demographic living with multiple comorbidities.

It also provides real world evidence from patient records that makes it easier for services to be tailored to clinical needs and for research programmes to develop effective treatments.

"Our health services are going to be increasingly driven by analysing data and focusing resources on those most at risk. It won't take away the human element of healthcare; it will make the human element more focused," adds O'Hanlon, a former GP who joined EMIS Group in 2000, and is part of a team that has helped the company become the UK's leading supplier of healthcare software.

"Data analysis will enable us to deliver better, more targeted care and empower patients to become more involved in their health. It will help the NHS better plan, have better delivery and better validation of what it is doing right."

This principle is central to the healthcare system's ability to create a sustainable future and is being identified as the driving force behind the growth in life sciences in the UK.

Privacy by design

"Modern analytics systems need to be built with data security as a core foundation component – before we do anything else data needs to be protected and secure," explains O'Hanlon. "Our systems have been built with privacy by

design, ensuring that there are strong controls on access to any item of data, respecting data controller permissions, patient consent and GDPR. This gives customers a strong foundation to start to make clever use of securely protected data."

Improving patient outcomes

The richness of the primary care records will help GPs and primary care networks identify patients in potential at-risk groups and schedule checks to pick up disease conditions earlier than waiting for them to self-report. It also helps meet the social care challenge of building pathways and networks to support people as they recover from or live with a chronic condition.

"Early identification of conditions such as cancer, obesity and dementia can improve survival rates. You can do that with the richest source of data, which is generally primary care records but you can also include pharmacy data, hospital attendance data, social care and socio economic data and analyse at-risk populations," O'Hanlon says.

EMIS-powered data has been fundamental to a range of recent research programmes that have generated revelatory detail about Long Covid, Deep Vein Thrombosis and blood thinning medication – studies conducted via QResearch, a database of over 35 million anonymised health records derived from GP practices.

Using this database, researchers at the University of Oxford and the New and Emerging Respiratory Virus Threats Advisory Group (NERVTAG) developed a population-wide risk assessment model called QCovid.

Award-winning QCovid was used by NHS Digital to predict on a population basis whether adults with a combination of risk factors may be at more serious risk from Covid-19 and should be prioritised for vaccination.

As a result, in February 1.5 million high-risk individuals were identified, added to the Shielded Patient List as a precautionary measure and prioritised for earlier vaccination. The research also played a vital role in raising public awareness of key Covid-19 risk factors.

Sharing data will also enable the public to engage more deeply with their health and achieve better outcomes and foster a more collaborative doctor-patient relationship. It also powers collaborations across industry, the NHS and technology. EMIS has more than 100 partner organisations as part of a healthcare ecosystem and is committed to working with life sciences and research to deliver the government's

THE POWER OF COLLABORATION

How data is at the heart of improving patient outcomes and population health



Data analysis will enable us to deliver better, more targeted care and empower patients to become more involved in their health

vision outlined in the 'Saving and improving lives: the future of UK clinical research delivery' policy paper launched in July 2021.

"This knowledge has led to changes that have benefited patients immediately," O'Hanlon adds.

"This approach provides real evidence that is vital to better healthcare," he says. "The NHS needs this so it can analyse its performance and make changes with confidence."

EMIS Group, which was formed 30 years ago by two GPs in Yorkshire, specialises in developing IT systems that now support 10,000 organisations across the full spectrum of healthcare, including 5,200 pharmacies, 4,500 GP practices and 80% of NHS acute trusts. Its award-winning QResearch not-for-profit collaboration with the University of Oxford uses GP approved anonymised historical records from around 45 million patients to inform research programmes and clinical practice. It has also developed a secure, cloud-based analytics platform which offers a powerful resource to researchers seeking to improve health and care.

"Data will continue to drive positive change across all aspects of health and the prospects are exciting."

A collaborative approach

EMIS has a heritage of collaboration to advance research. As well as QResearch, it is a key partner in the OpenSAFELY platform, a collaboration headed up by Dr Ben Goldacre MBE that was set up to drive knowledge about Covid-19.

NHS England researchers using OpenSAFELY are benefitting from a secure research environment within the cloud-based EMIS-X Analytics suite which allows the records of all EMIS' 4,000 English GP practices to be searched as one.

The researchers, who are based at the University of Oxford and the London School of Tropical Hygiene and Medicine, recently published a clinical paper which revealed that Long Covid was being under-diagnosed.

"This is the first in a wave of research projects to benefit from the newly-extended OpenSAFELY platform," said Goldacre, director of the DataLab at the University of Oxford, who leads the project.

"We are hugely grateful to EMIS for its months of hard work to enable us to reach this landmark position, with researchers now able to access the health records of 96% of the UK population, under COPI (control of patient information) legislation, with all of the privacy and transparency features of OpenSAFELY."

"Good data on Covid is crucial for research and, though the immediate threat from the pandemic is now receding, there is much more work to be done to benefit public health and medical knowledge as we move forward."

O'Hanlon added: "As the UK's leading provider of healthcare software, EMIS is proud to support NHS England and OpenSAFELY through this collaboration."

"By enabling secure access to the primary care records of 35 million patients in England, and linking those to a number of other national datasets plus data from other system suppliers, researchers are now able to run analysis across almost the whole of the English population at source."

For more information please visit emishealth.com/sectors/research



Data privacy and the future of healthcare



Health tech is central to the future of medicine and diagnosis. But to unlock its potential, clinicians need access to health data, which patients may not hand over so easily

Alice Broster

Since the onset of Covid-19, we’ve become far more accustomed to consuming health data. Whether it’s using telemedicine platforms or signing up to NHS Track and Trace, health data collection has become a very real and visible part of our lives.

According to the government, health data collection and distribution shaped our response to “the greatest public health emergency that this country has tackled for generations” and “made all the difference”. But this begs the question – where does data privacy fit into the future of healthcare?

In its draft policy paper, Data saves lives: reshaping health and social care with data, published in September 2021, the UK government

said the sharing of health data during the pandemic helped to inform the response over who would be most vulnerable to the effects of the virus and who should shield. Data supported vaccine development efforts and trials, while health records were used to dictate who had the earliest access to vaccines when they were made available.

Such efforts are “using data as intelligence to help us to define policy”, according to Professor Mark Lawler, scientific director at the DATA-CAN health data research hub and professor of digital health at Queen’s University Belfast.

At the beginning of the pandemic, there was no data on the impacts of the pandemic or the lockdown and the indirect impacts they were

having on cancer presentational delay, diagnostic delay and treatment delay, he says.

“That’s where we started,” he continues. “Initial data showed us that seven out of 10 people who had a suspicion of cancer either weren’t going to or weren’t being seen by specialist cancer services. We presented our data to WHO Europe and the European Cancer Organisation and from that point, it became a European effort.”

The mass sharing of public health and patient data isn’t unique to the last two years. In 2002 the UK Health Service (Control of Patient Information) Regulations were introduced, which give the current health secretary the right to access health data in times of health emergencies. This can be used in “the surveillance and analysis of health and disease, the monitoring and audit of health and health-related care provision and outcomes where such provision has been made, [and] the planning and administration of the provision made for health and health-related care.”

This means the government can gain healthcare data on everything from cervical cancer screenings to vaccination rollouts. In response to Covid-19, then health secretary Matt Hancock initiated the right to access and share data in April 2020.

While health data is a key component in the government’s response

to the pandemic, many telehealth and online health services have also reported a rapid uptake. According to a recent analysis by McKinsey and Company, telehealth use has increased by 38 times compared to before Covid-19.

Online doctors have been praised for increasing access to healthcare during Covid-19 without putting patients at risk of catching the virus in a medical setting. However, with increased use of telehealth services comes increased health data sharing.

At the height of the pandemic, online doctor and digital healthcare company Babylon “experienced a boom in app usage in the UK and saw a need for expanded services”, said a spokesperson. Its team of engineers built its Covid-19 Care Assistant in just 10 days, the spokesperson said, offering 8% of

the population AI-led technology that helped triage patients and minimise the burden on clinicians, hospitals and A&E.

“The increased demand for virtual care also led to Babylon becoming the UK’s largest and fastest NHS GP practice, with over 100,000 registered patients,” the spokesperson continued. “Babylon also launched in the US in 2020 and is quickly expanding to cover 3.5 million patients.”

As usage has increased, the general perception of telehealth services has improved. Alice Pelton is the founder of The Lowdown, a review platform for contraception. She notes that the move to online services was already occurring.

“Being able to book [an appointment] for a time that suits you, being able to get evening or weekend appointments that work around people’s work or childcare” and being able to speak to your doctor from the comfort of your home were all factors in people’s move to online, she says.

A spokesperson for SH:24, the digital sexual health service, has the same opinion. “The frustration felt by those trying to access basic sexual health services is palpable in most clinics. Pre-Covid clinic waiting rooms were packed and tense,” the spokesperson said. “By expanding opportunities for accessing services, we believe we have improved

“You need to consider how you balance maintaining the privacy of the individual with using the data for good

service user experience, helped transform the healthcare system and reduced the physical and psychological impact of an unintended pregnancy and/or sexually transmitted infection.”

The increased access to personalised and accessible care, achieved in part by the growing collection and sharing of health data, sounds ideal. But as health data cultivation has developed, breaches have become an unfortunate norm: few data sets are more sensitive than our health data.

According to a study published in February 2021, hospital data breaches increased across the US in 2020, affecting around 26.4 million people. Healthcare data breaches have doubled since 2014. As recently as July 2021 fears were expressed over thousands of NHS patients’ private data being shared with strangers as details were mistakenly mixed up and sent out to the wrong patients.

Understandably, this may make you sceptical about the future of mass sharing of health data and your privacy.

“You need to look at how you balance maintaining the privacy of the individual with using the data for good. It’s paramount that we protect the privacy of the individual while also being effective,” says Lawler.

The NHS protects patient data through a series of cybersecurity provisions, according to the service. It monitors for threats and vulnerabilities 24 hours a day and has virtual perimeter security. However, news of breaches can undermine public confidence in the collection and sharing of health data.

“We see the same hiccups over and over again. There’s a particular focus on commercial access to health data. There needs to be transparency about what’s happening,” says Saron Bowers, head of policy at the Wellcome Sanger Institute, which focuses on genomic science. “A lot of people when they hear health data they think of their health records. It can also be a genomic sequence. And when you create on a large scale you get more depth. You can identify variations in patients and adverse drug reactions, which cost the NHS a huge amount of money every year and really impact patients’ lives.”

She continues: “Having the data to spot that is transformational. Sharing of health data also has a massive impact on public health. We’ve been able to rapidly identify variants and target public health. As we’ve done that for Covid-19 we can use it for other diseases.”

It seems that transparency in the way health data is collected, stored, regulated and used is the key to gaining public trust in parting with their information. With developments in treatments and patients’ quality of life listed as some of the top benefits of cultivating health data, it’s tempting to overlook the ever-increasing privacy issues and breaches.

Conducting work in a trusted research environment may be one way of gaining the public’s trust, says Lawler.

“The sharing of health data has a massive impact on public health

“Rather than data moving around and running the risk of potential privacy breaches, you keep the data in a very safe environment and then you have safe researchers who are trained to deal with privacy issues,” he explains. “We sometimes call it the five safes; safe people working in safe environments with safe technology looking at developing safe outputs that are relevant to patients” leading to safe data.

Both Lawler and Bowers emphasise the importance and benefits of including patients in data cultivation and sharing through advisory boards. Participants can bring views on why something shouldn’t be done for reasons the professionals might not think about, notes Bowers.

“And if anything goes slightly wrong, having participants there to speak up can be a really valuable asset,” she continues. “That’s not to say you should put them on the line, but I think having them to speak up for themselves can be really valuable.”

Covid has highlighted the global response that can be achieved if research bodies and countries share

health data. But should individuals put their health information at risk of breaches and invasions of privacy in the name of disease diagnosis and treatment?

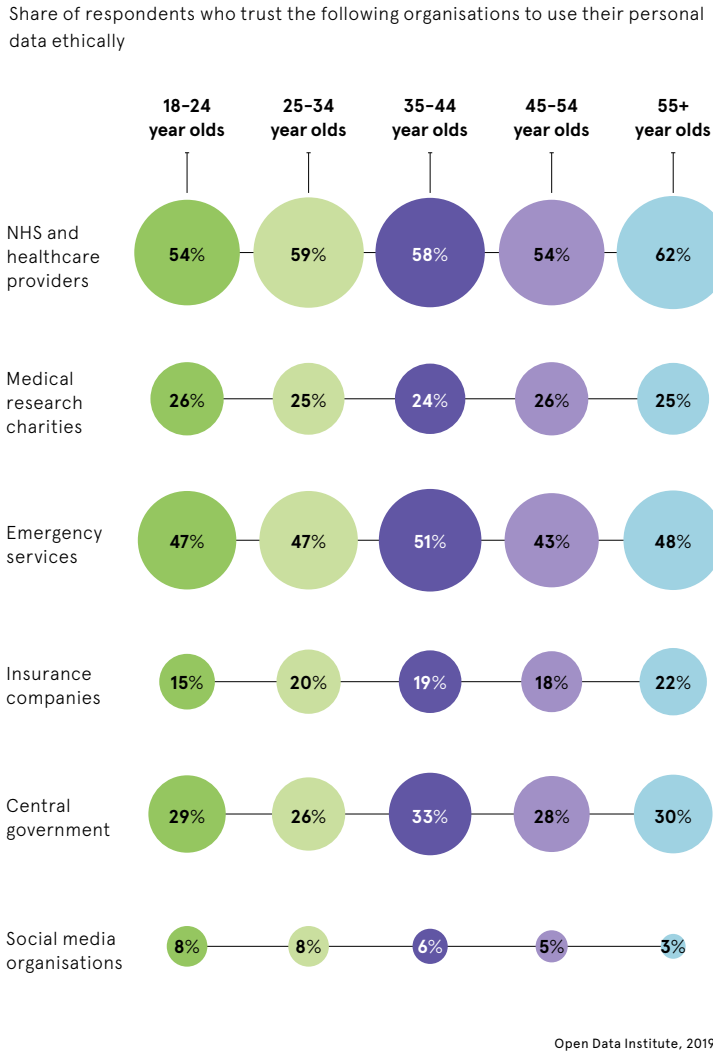
At times, thousands of people have died and billions of pounds wasted when health data hasn’t been used or exploited to its full potential, according to a study published on Science Direct. However, the report concluded that “a wider understanding of the nature of health data is required before it can be captured and successfully tamed.”

If the increased sharing of health data is to become a key factor in improving healthcare and the lives of patients around the globe, privacy security will need to develop just as quickly. This doesn’t just mean complying with regulations set out by the General Data Protection Regulation (GDPR) or the US Health Insurance Portability and Accountability Act (HIPAA). It also means encrypting data and restricting access to it, as well as educating the staff that work within the healthcare system and handle sensitive data.

Similarly, after so much exposure to health data in our everyday lives, Bowers predicts an increase in the widespread knowledge of how health data is used and the privacy concerns surrounding it.

“We all talked about our different vaccines like they were wine varieties. I didn’t know anything about lateral flow tests before,” she says. “So knowledge does seep through. I think the public will be more knowledgeable about health data and I think that needs to be encouraged.” ●

WHO DO YOU TRUST WITH YOUR PERSONAL DATA?



EVERY YEAR RESEARCH IS SAVING AND IMPROVING MILLIONS OF LIVES.

EMIS
connecting healthcare

ENABLING ETHICAL RESEARCH THROUGH TECHNOLOGY

We’re bringing patients, healthcare clinicians and researchers together to enable us all to live longer and healthier lives.

To find out more about EMIS please visit emishealth.com/research



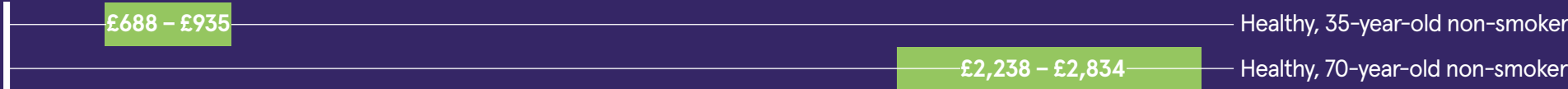
THE UK'S PRIVATE HEALTHCARE MARKET

Healthcare in the UK is sometimes thought to be synonymous with the National Health Service. But private sector hospitals and service providers treat well over 1 million patients in the UK every year. The private sector also provided invaluable support to the NHS during the height of the Covid pandemic. This segment of the UK's healthcare market is often overlooked, but should not be underestimated.

THE COST OF GOING PRIVATE

Average annual costs for private health insurance in the UK

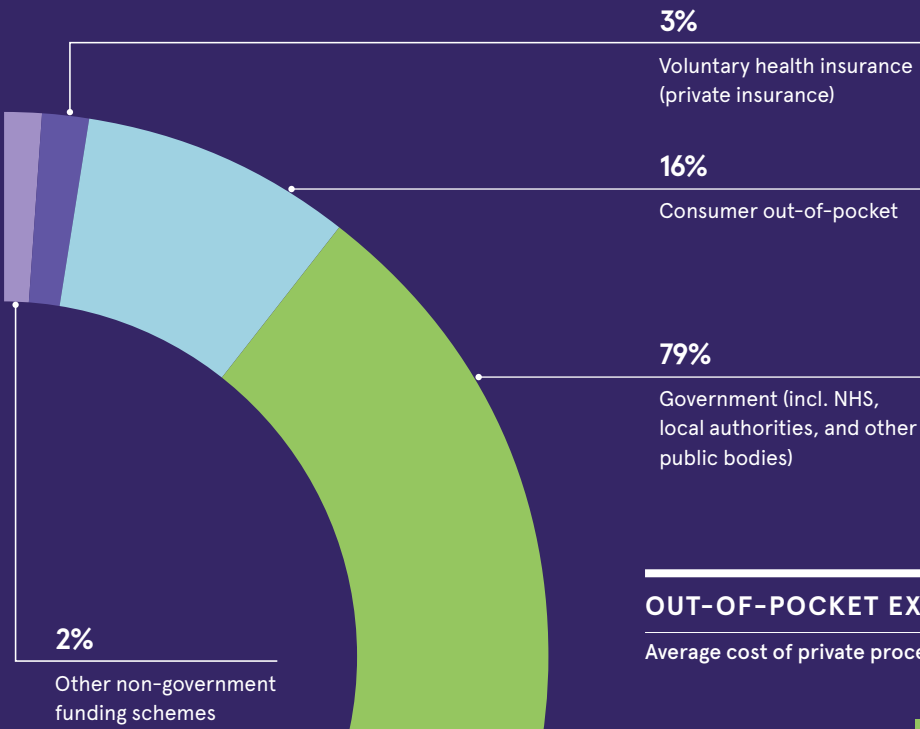
Money Saving Expert, 2021



THE RATIO OF GOVERNMENT TO NON-GOVERNMENT HEALTHCARE EXPENDITURES IS 4:1

Office for National Statistics, 2019

Share of total healthcare expenditure in the UK



SOCIAL CARE AND THE PRIVATE SECTOR

Commonwealth Fund, 2020

78%

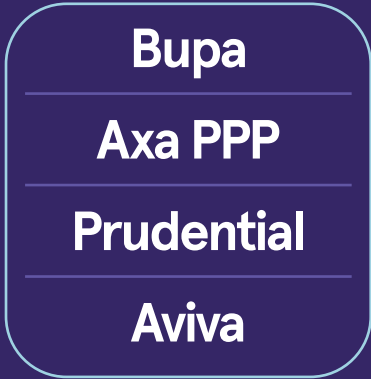
share of residential care places provided by the private sector for older people and physically disabled people in the UK

86%

share of nursing home places provided by the private sector

PRIVATE HEALTH INSURANCE IS DOMINATED BY FOUR COMPANIES

The four largest private health insurance providers in the UK



Mordor Intelligence, 2020

OUT-OF-POCKET EXPENSES

Average cost of private procedures in private healthcare

myTribe Insurance, 2020

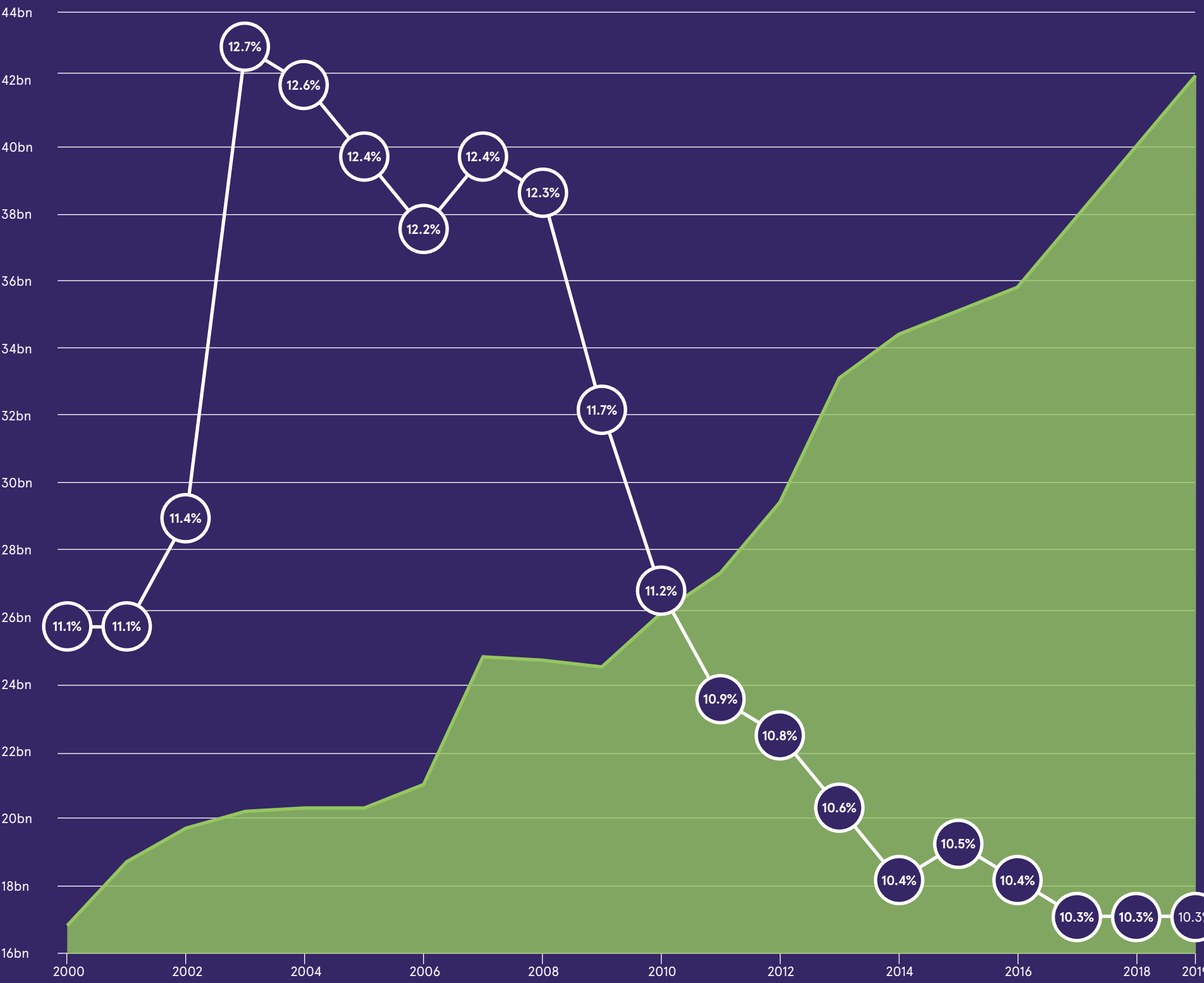


WHILE PRIVATE COVERAGE HAS REMAINED STEADY, PRIVATE EXPENDITURE IS STEADILY RISING

Office for National Statistics, 2019

Share of UK population with private health coverage and total private healthcare expenditure

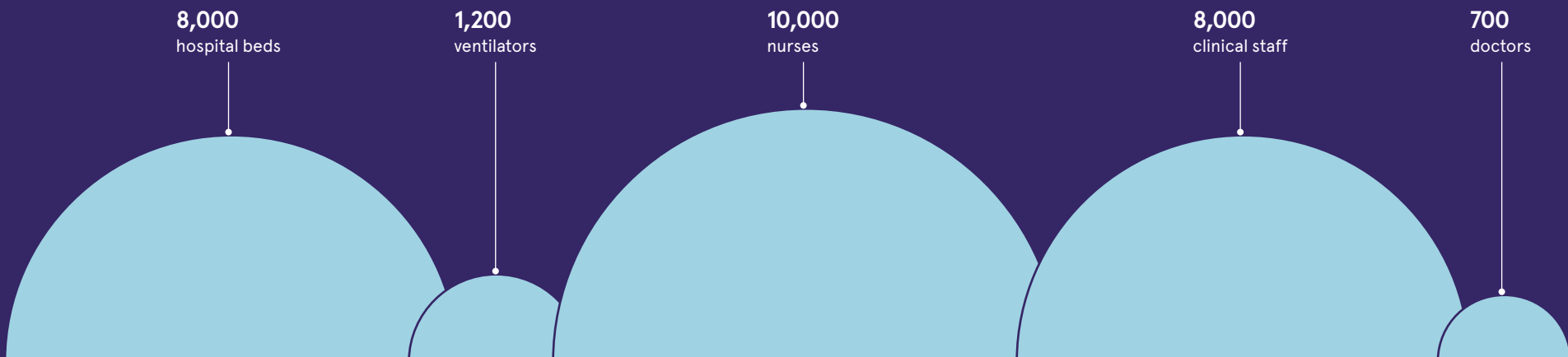
Expenditure (green area) Percent of population (blue line)



PRIVATE PROVIDERS AND THE COVID PANDEMIC

Sky News, 2020

In the early months of the pandemic, the UK government paid £400m per month for private sector health services and staff, which included



PHARMACEUTICALS

Can big pharma justify its big price tags?

It’s easy to attack pharmaceutical giants for their eye-watering profits, but list prices for new medicines don’t give the full picture

Natalie Healey

In June of this year, five-month-old Arthur Morgan became the first person in the UK to be treated with one-off gene therapy Zolgensma, manufactured by Novartis. A single dose of the potentially life-saving therapy for spinal muscular atrophy (SMA) is an astonishing £1.795m, making Zolgensma the most expensive drug in the world.

Untreated SMA causes muscle weakness and paralysis, and is the leading genetic cause of death in children. Zolgensma treats the root cause of the disease; clinical evidence suggests it can significantly improve motor function in young patients.

The drug’s approval was a milestone for families with SMA, but it does raise the question: can pharmaceutical companies justify such hefty prices for their medicines?

For many people, the gut reaction is “no”. The pharmaceutical sector has long been synonymous with corporate greed and there are plenty of examples that paint the industry in a less than positive light. In 2019, pharma giant Johnson and Johnson was fined \$572m (about £460m at the time) for its role in the US opioid crisis. Four years earlier, Martin Shkreli, then CEO of Turing Pharmaceuticals, sparked outrage by jacking up the price of a cheap pill by more than 5000% when the company bought the rights to the treatment: Daraprim, which treats a life-threatening parasitic infection, went from \$13.50 to \$750 overnight.

“We cannot have an industry that’s supposed to fulfil such an essential social task acting in purely profit-centric terms,” says Diarmaid McDonald, co-founder of Just Treatment, a UK group raising awareness of the impact that high drug prices have on people’s lives.

However, some argue that pharma’s profits have a purpose beyond lining shareholders’ pockets. “The global pharmaceutical industry spends close to £200bn a year on

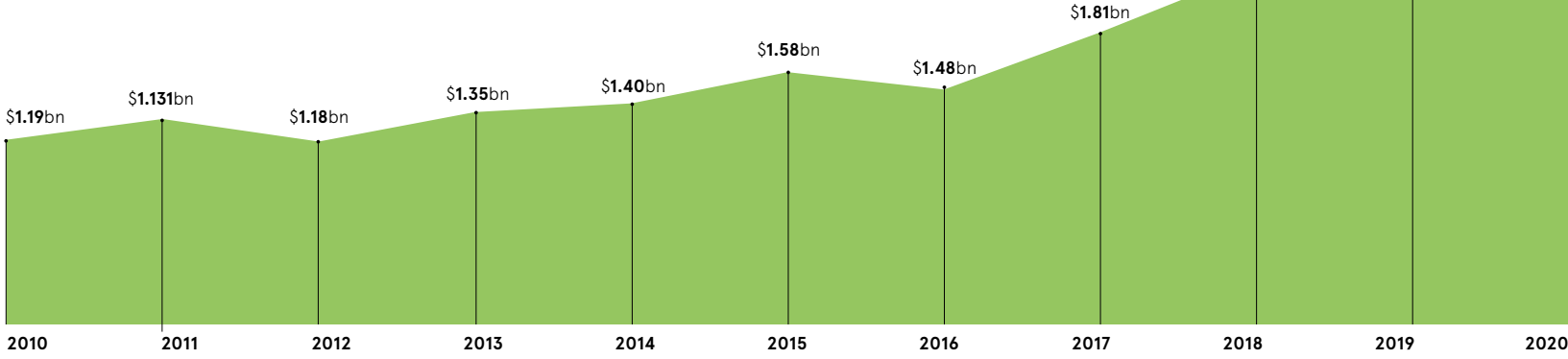
research and development for new treatments,” says David Watson, executive director, patient access at the Association of the British Pharmaceutical Industry (ABPI). The vast majority of this spending won’t translate into returns for the sector, he points out, because nearly all potential medicines in development never receive regulatory approval.

Few would dispute the value of R&D during the coronavirus crisis. Vaccines manufactured by companies such as Pfizer and AstraZeneca have changed the course of the pandemic. In September, England’s deputy chief medical officer Jonathan Van-Tam announced that Covid vaccines have saved 112,000 lives in the UK. Watson says companies were only able to develop the jabs so quickly because of decades of R&D.

But McDonald believes that we shouldn’t necessarily see pharma as our saviour. The industry was also able to develop vaccines with unprecedented speed thanks to public sector funding. “All of that investment was de-risked through advanced purchase commitments,” McDonald explains. With governments pouring billions into Covid-19 vaccine pipelines, pharmaceutical companies were protected from

HOW MUCH DOES IT COST TO MAKE A DRUG?

Average cost to develop a pharmaceutical compound from discovery to launch
Deloitte, 2021



“We cannot have an industry that’s supposed to fulfil such an essential social task acting in purely profit-centric terms

weren’t given Zolgensma, one could argue that the drug provides clear value as a one-time treatment.

In the UK, the National Institute for Health and Care Excellence (NICE) determines the value of a new medicine by working out how much it costs to give a patient an extra year of “quality life” compared to the current treatment offered. If the new treatment is deemed to be too expensive relative to the benefits, it won’t be recommended for use within the health service.

However, this somewhat inflexible system does mean that some patients lose out. This was the case in 2018 when cystic fibrosis patients in the UK were denied Orkambi. The drug cost £100,000 a year per person and was then the only treatment for the condition.

Health systems don’t usually pay the full ‘list price’ for a new medicine, says Leslie Galloway, chairman of the Ethical Medicines Group, a trade association of small and medium-sized pharmaceutical companies in the UK. Many countries have negotiated schemes that allow them to provide medicines to residents in more cost-effective ways, though these true prices are confidential. In October 2019, NHS England struck a deal with manufacturer Vertex that allowed people with cystic fibrosis to get Orkambi on the health service.

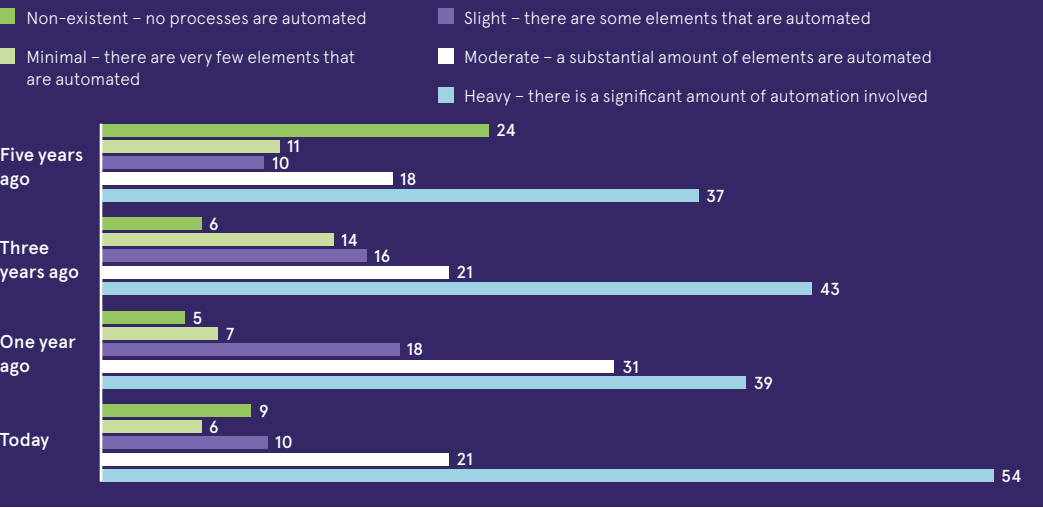
A simple solution would be to prevent companies from charging extortionate prices for drugs in the first place, but that approach might have unintended consequences. The US National Bureau of Economic Research found that cutting drugs prices by 40% to 50% would lead to 30% to 60% fewer R&D projects. It suggests that reforming the sector in a way that doesn’t endanger innovation – and therefore life-saving treatments – would be challenging.

The UK’s 2019 Voluntary Scheme for Branded Medicines Pricing and Access (known as VPAS) between the pharmaceutical industry, the government and the NHS aims to strike a balance between supporting innovation and ensuring patients are able to access medicines at affordable prices. Under VPAS, which runs until 2024, the NHS’s bill for branded medicines won’t grow by more than 2% a year. Pharma firms must foot the bill for anything above this spend.

Such schemes show that the pharmaceutical industry does “an awful lot of good that people don’t see” says Galloway. There are no excuses for bad behaviour, such as Shkreli’s, he adds. But it’s hard to deny the critical role the sector plays in developing treatments that improve, extend and save lives. ●

Commercial feature

HOW WOULD YOU DESCRIBE THE LEVEL OF AUTOMATION INVOLVED IN YOUR DAY-TO-DAY ROLE IN THE FOLLOWING TIMEFRAMES?



Enabling smarter healthcare with intelligent automation

Healthcare services need to be delivered smarter, faster and more efficiently than before, even as the sector seeks to build back following the pandemic

Covid-19 has had a profound effect on the way NHS trusts and wider healthcare organisations approach automation. For those that already had a deployment in place when the pandemic struck, automation unlocked critical agility and flexibility, enabling them to overcome new challenges and regulations with haste and without needing to draft in bank staff or further stretch existing staff.

As healthcare systems seek to recover after the pandemic, leaders are under pressure to address an unprecedented backlog of care and increased waiting times, while operating within strict financial constraints. At the same time, they must find ways to create space for healthcare professionals to recover from the intense pressures of the past 18 months amid acute staff shortages. This is a unique set of challenges that requires collaboration across many systems and stakeholders. Thankfully, developments in digital technologies are helping healthcare leaders reimagine processes and services as we enter a new era of healthcare provision.

Blue Prism, the global leader in intelligent transformation and vendor of choice for the NHS, is supporting NHS organisations to reimagine processes and services with technologies that are fuelling a new era of healthcare provision. By going beyond RPA to provide intelligent automation, Blue Prism enables organisations to meet their strategic business priorities, support their people and create exceptional patient experiences.

To understand this paradigm shift in more detail, Blue Prism surveyed 100 senior leaders from healthcare

organisations across the UK to get a glimpse of the role automation plays in their organisation and how it’s contributing to their short- and long-term ambitions.

The survey found that 97% of UK healthcare leaders expect to see more automation in the coming years, with 72% already having a strategy in place to support investment. Meanwhile, 75% of healthcare leaders report having a heavy use of automation in their organisation today, compared to just 55% five years ago. This coincides with 94% citing that the pandemic has advanced their use of automation.

Unsurprisingly, given the long-term challenges faced by the NHS and compounding factors such as Covid-19 and Brexit, healthcare leaders are looking to double down on the health of their finances in the next 12 months. When asked, 33% of respondents cited ‘maximising financial sustainability’ as the top item on boards’ agendas, while 58% put it in their top three priorities.

Patrick Shephard, head of public sector at Blue Prism, says the key to meeting these imperatives and overcoming challenges of the past is to do more for patients with the same resources or less. Improving the patient experience is dependent on enabling more effective, streamlined patient pathways. Central to this is cutting wait times, making care more transparent and giving doctors and nurses more time to spend with patients.

To achieve this, services must be delivered smarter, faster and more efficiently than before. Intelligent automation enables healthcare organisations to bring in digital workers—software designed to emulate the work people do within business systems—to execute

rule-based tasks such as appointment bookings and referrals.

Shephard says: “By digitising back-office patient processing, automation is helping to expedite pathways across a multitude of departments. For example, East Suffolk and North Essex NHS Foundation Trust has reduced the time it takes to manually process a referral from five hours to a mere five minutes”.

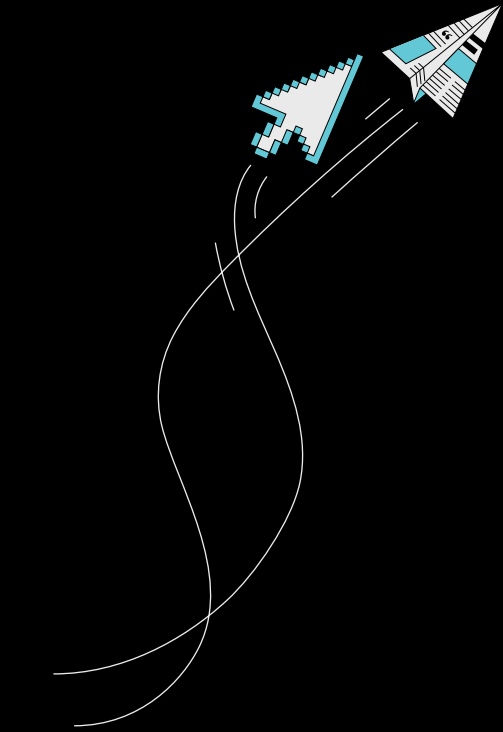
“Blue Prism digital workers are also working to reduce the elective care backlog at several trusts. By validating patient data on the waiting list to ensure they are set at the right priority and still require care, automation is ensuring patients are seen as efficiently as possible.”

Automation is also helping NHS trusts to save millions of pounds; for example, an automation programme saved Morecambe Bay NHS Foundation Trust £1m in the first year, freeing up resources to spend on frontline care. Another trust has experienced a 50% reduction in sick leave since the introduction of automation, with their staff citing less stressful workloads and a better work life balance.

There is a real opportunity for intelligent automation within healthcare, where digital workers provide a sustainable platform for more joined-up care, seamless patient pathways, and an engaged and productive human workforce, says Shephard.

For more information, please visit blueprism.com

blueprism®



Want the power of print media combined with best in class lead generation?

Raconteur’s new campaign product suite gives marketers the best of both worlds.

Email enquiries@raconteur.net to plan your campaign now.

RACONTEUR

INNOVATION

Five transformational advances in medical tech

From an AI-powered early-warning system for post-operative complications to a non-invasive colonoscopy alternative, here are some innovations that are paving the way for a better tomorrow in healthcare

Julie Penfold



Testing the water for post-op complications

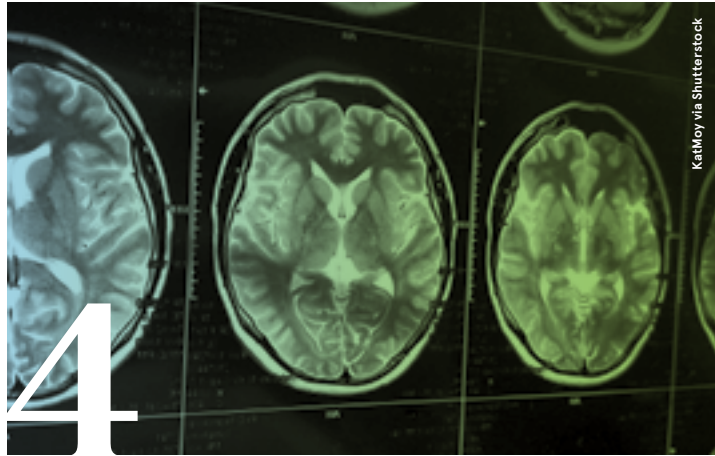
Acute kidney injury is a common and serious complication that can develop following cardiac surgery. Affecting about a third of patients who have undergone heart operations, it costs the NHS an estimated £1.2bn a year to treat. Rinicare, a team of Manchester-based clinicians, has devised a risk-prediction technology called Stability UO. This uses artificial intelligence to analyse routinely captured data – particularly urine output – from post-operative patients in recovery. The platform can identify subtle signs of deterioration and act as an early-warning system to prevent dangerous complications from developing. The system can also identify low-risk patients, potentially allowing

them to be safely removed from critical-care units to free up bed space more quickly. It has been approved for use in the UK and is being evaluated in a number of NHS hospitals. “Acute kidney injury is a major concern for clinicians. It is 100 times more deadly than MRSA and it’s associated with short- and long-term morbidity and mortality for patients,” says Rinicare’s chief medical officer, Stuart Grant, a lecturer in cardiothoracic surgery at the University of Manchester. Stability UO, he adds, has “huge potential to reduce the incidence of acute kidney injury following cardiac surgery. Giving clinical teams advanced warning that it may be developing allows them to take timely action to protect kidney function. This is vital for improving patient outcomes.”



One giant leap for osteoporosis treatment

Osteoporosis is a progressive fragile bone disorder that affects more than 3 million people in the UK. From the early years of the space age, NASA knew that its astronauts lost bone mass at a significant rate during their time in zero gravity. Its long search for an effective solution since then has led to the discovery of low-intensity vibration as an osteoporosis treatment. Marodyne LiV, the first medically approved device that can both treat and prevent the condition, resembles a set of bathroom scales with a mains power supply. The patient simply stands on it. The machine calibrates itself to their weight to ensure that it gives the right level of high-frequency vibration to stimulate their osteoblasts (bone-building cells) and inhibit their osteoclasts (bone-resorption cells). Studies indicate that using the device for only 10 minutes a day can help to improve users’ bone mineral density, halt the loss of bone tissue and stimulate new growth.



A headset for a healthier mindset

Daniel Månsson, a clinical psychologist, and Erik Rehn, a neuroscientist, have developed Flow, a medically approved home treatment for depression. It uses a device that looks like a pair of headphones to deliver transcranial direct-current stimulation. This is a proven method that applies a tiny amount of electricity to the dorsolateral prefrontal cortex – an area at the front of the brain that’s been shown to be less active in people with depression. Well over three-quarters (81%) of patients witness a reduction in

“If I hadn’t taken the test, I could now be walking around with cancer,” she says. “The survival rate for oesophageal cancer isn’t good, so to know that I have the all-clear is fantastic.” A comparable piece of ingestible technology in development is focused on the other end of the digestive system. NHS bodies are working with Danish firm CorporateHealth International and West Midlands 5G on a pill-sized device containing two tiny cameras. Once it reaches the patient’s large intestine, this piece of smart tech will capture and send images straight to the lab for analysis via a 5G network, delivering what’s known as a colon capsule endoscopy. “Bowel cancer is the second-biggest cancer killer in the UK. It accounts for about 20,000 deaths each year,” notes Professor Ramesh Arasaradnam, senior gastroenterologist at the University Hospitals Coventry and Warwickshire NHS Trust. “But we also know that, if it’s detected early, the prognosis is good.”

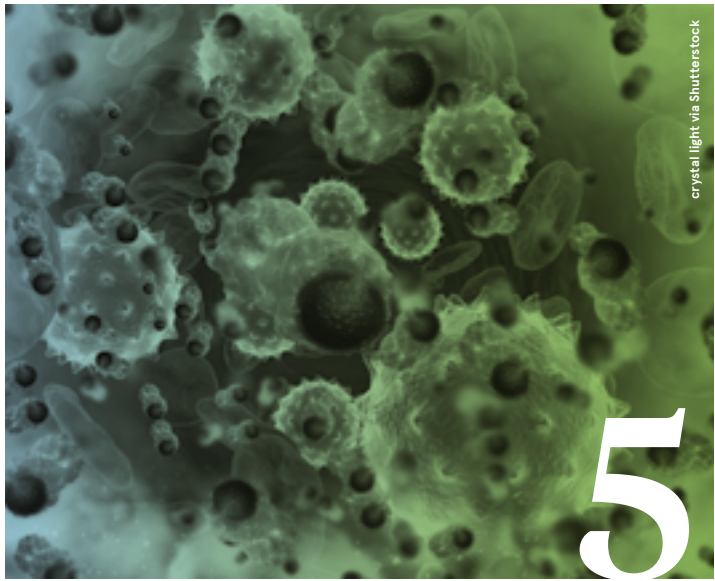


You tube: ‘DIY’ substitutes for an endoscopy

Barrett’s oesophagus is a condition of the gullet that can be a precursor to oesophageal cancer. Eight out of 10 patients who are diagnosed and treated for this type of cancer at an early stage will survive it for more than five years. To help identify cases of Barrett’s oesophagus more quickly, cheaply and comfortably than a conventional endoscopic biopsy can, Cyted has developed a test kit called the Cytosponge. This takes the form of a pill-sized capsule attached to a length of fine thread. The patient ingests the capsule and most of the thread. Its casing dissolves in the stomach after a few minutes, leaving a spherical rough sponge, which collects a tissue sample from the oesophagus as it’s pulled back up by the thread to be regurgitated. The NHS is rolling out 3,500 kits in England and Scotland. One patient who took a Cytosponge test as part of a trial at her GP practice feels that it could have saved her life.

Breast cancer testing on the double

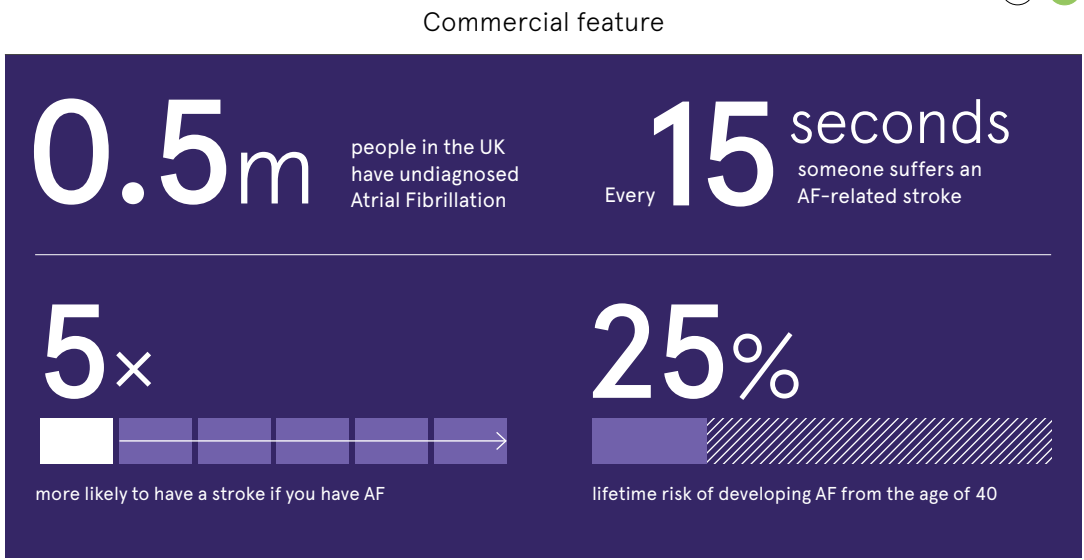
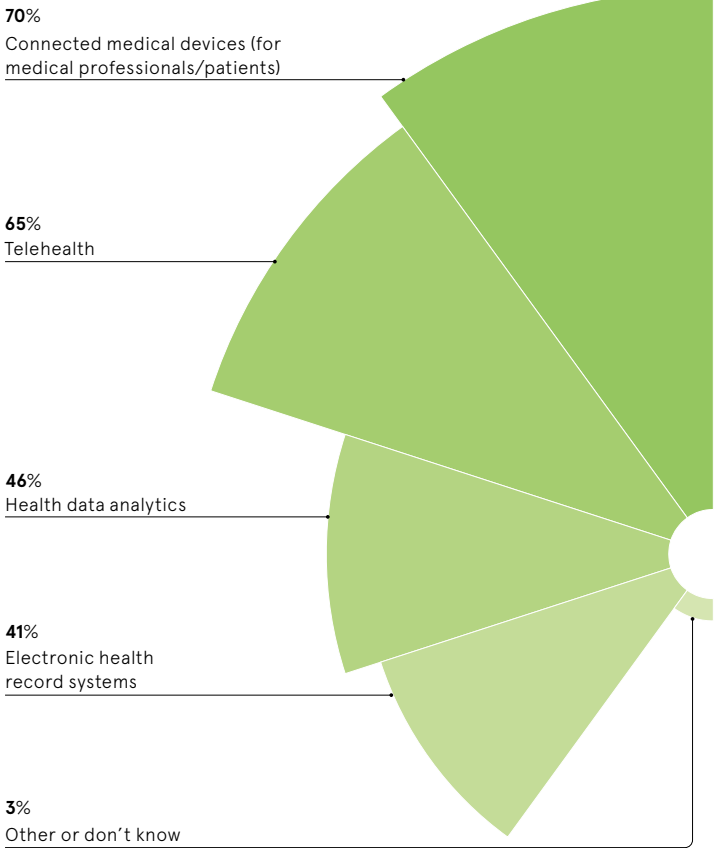
A team of artificial intelligence experts and cancer scientists have created an AI platform that can detect virtually imperceptible differences in the appearance of cancer cells. These variations reveal important insights about the cells’ molecular state, which can in turn inform the most appropriate treatment choices. Breast cancer is the most frequently diagnosed cause of cancer-related death among women. In the UK, there are about 55,900 new cases each year. Clinicians using the PANProfiler image-analysis platform from Panakeia can receive information to help them make breast cancer treatment decisions within 15 minutes, instead of waiting days or even weeks for the results of lab tests. It’s recently been approved for use in the UK and Europe. “This exciting technology has the potential to save lab resources and also to improve turnaround times for biomarker results for patients with invasive breast cancer,” says Sarah Pinder, professor of breast pathology at King’s College London. Panakeia is planning to develop its technology to tackle other types of cancer. Its mission to accelerate the processes of diagnosis and treatment is driven by personal experience. The company’s co-founder and CEO, Pahini Pandya – a former cancer researcher – knows all too well how stressful the wait for test results can be. “When I was doing my PhD at King’s College London, I had my own cancer scare,” she explains. “I had to wait nearly a month to get the all-clear, which was a harrowing experience. But I also knew what the challenges were and why it was taking so long, because I was conducting those very tests myself. It was a pivotal event.”



WHAT’S NEXT FOR HEALTH TECH?

HPE, 2021

Opinions of IT decision-makers and clinicians on which technologies will most impact the future of health services



How early detection and rapid diagnosis are transforming cardiac care

Machine intelligence is finally providing a workable solution to the historic challenge of detecting cardiovascular disease early enough to meaningfully reduce premature mortality

Cardiovascular disease is one of the biggest killers in the UK. Responsible for a quarter of all deaths, of which the most common include heart attacks and stroke, and the largest cause of premature mortality in deprived areas, it’s a leading health concern. So much so that in the NHS Long Term Plan, it is noted as the single biggest area where the NHS can save lives over the next decade. In England alone, approximately half a million people have undiagnosed atrial fibrillation (AF), which is the most common cardiac arrhythmia. Among those who have AF, the risk of stroke increases by 500% and strokes are often more severe. Stroke is a devastating disease for patients and their families, and is estimated to cost the NHS around £3bn per year. Detecting cardiovascular diseases such as AF early is extremely important in facilitating timely treatment. AF treatment with anticoagulation can, for instance, reduce stroke risk by 66%. However, early detection has been the greatest challenge of all. “Early detection and treatment of cardiovascular disease has been a huge concern because patients gaining

access to expert care is difficult and the process can be complex,” says Sean Warren, business director at AliveCor. “There are situations where a patient might get in front of a GP, paramedic or emergency physician but actually at that time needs to be with a specialist, such as a cardiologist. If their symptoms are paroxysmal, which means they don’t experience them all the time, it’s difficult to capture the abnormality when they are examined in a single time point.” Fortunately, advances in technology are helping to better facilitate early detection and, therefore, more rapid diagnosis and treatment. The faster physicians can identify symptoms in patients, the sooner they can intervene and significantly reduce their risk of premature death. Technology ultimately holds the key. Specifically, pioneering machine-learning techniques are essentially transporting hospital capabilities into people’s homes, bringing the necessary medical support to the doorsteps of those who need it most. With the assistance of intelligent mobile technology, patients no longer have to wait for a hospital appointment then a referral to an outpatient clinic. It also means physicians can, at the right time, understand symptoms without needing to be physically with the patient. Leading the way with technology to enable a more proactive approach to cardiac care is AliveCor’s KardiaMobile solution. KardiaMobile is the world’s most clinically validated personal electrocardiogram (ECG) device, providing instant analysis for the detection of atrial fibrillation and other common arrhythmias in just 30 seconds.

The current gold standard is a 12-lead ECG, but it can be cumbersome. Patients must travel to a medical setting, undress and place sticky pads on multiple parts of their body. Sometimes multiple visits are needed if the irregularity has not been captured, leading to an increased time to diagnosis. When a 12-lead ECG isn’t required, patients experiencing symptoms can simply pull out the KardiaMobile device, capture the abnormality and share it with a physician. The device provides a patchless, wireless and pain-free ECG in just 30 seconds on a smartphone or tablet. “We’re basically giving a patient or physician the ability to have a medical-grade ECG in their pocket,” says Warren. “It also provides the ability for a user – be that a patient or a physician – to share that ECG reading with a healthcare professional, anytime and anywhere. “It’s becoming increasingly important in all healthcare scenarios that people are empowered to take a more active role in managing their health in partnership with their healthcare professional. Our technology facilitates remote patient monitoring and supports our mission to save lives and transform cardiology not just in the UK but globally.”

Could you be doing more to contribute to the closing of the detection gap in the UK? For more information, visit alivecor.co.uk



“We’re basically giving a patient or physician the ability to have a medical-grade ECG in their pocket

Social care that offers the right fit

Due to demand in the sector, all too often, people are based in social care services that do not meet their needs, leading to placement breakdown, significant distress and increased cost, but Exemplar Health Care is striving to do things differently.

The demand for specialist care services that require expertise, high staffing levels and specialist facilities is growing, however many ‘mainstream’ care providers are struggling to deliver.

Exemplar Health Care, a provider of specialist nursing care, is taking a stand to ensure that people get the right care, by the right team, the first time round.

The company, with its bespoke services, clinical expertise and high staff-resident ratios, has developed a portfolio of 35 community-based care homes where people can access the specialist care they need while remaining close to their loved ones.

“Finding the right nursing care for adults living with complex care and health needs can be difficult,” says Rachel Calladine, business development director at Exemplar Health Care, which has been growing steadily for 20 years. “Not all services have the right facilities and expertise to meet people’s complex needs, particularly those who display behaviours that challenge, which can often lead to placements failing.

“This causes significant distress for individuals and their family members,

as well as increasing the cost to the local health and social care system.”

The provider’s holistic approach, which has become a hallmark of its nursing homes’ high-quality care model, ensures that people receive the right care from the start and are empowered to live a fulfilling life.

“It is about a person receiving the right care, in the right environment and from the right team so they can achieve their potential and live their best lives,” says Calladine. “It is disappointing that around 60% of our service users come to us after a failed placement with another provider, which often causes them and their family distress, and their health to deteriorate often necessitating longer term and more expensive care.”

Exemplar Health Care, which aims to add more homes to its portfolio over the next few years, is a leading provider of specialist care that is delivered in nursing homes with a strong community feel.

Demand for complex care services is growing. This is in part due to the increasing number of children born with complex medical conditions, as

A community you can be proud to work with

Exemplar Health Care has grown organically since it opened its first five care homes in 2001 after identifying a lack of appropriate care homes for young adults living with complex needs.

It now employs more than 3,500 staff across 35 homes and is recruiting as it looks to double in size over the next five years. All staff have comprehensive induction and in-house training with options to further CPD awards. The group has digitised its administration to streamline paperwork demands on staff and liberate them to devote time to caring for residents.

“Teamwork is at the heart of what we do. This is a demanding and emotionally challenging job but it is incredibly

rewarding and we have fun in the workplace,” says Rachel Calladine, business development director. “We want our residents and our dedicated staff to be happy.”

The strong learning and development culture is supported by a robust health and wellbeing programme.

The roles at new and existing care homes include home manager, clinical nurse manager, physiotherapists, occupational therapists, unit managers and registered nurses, healthcare assistants, chefs, housekeepers and maintenance staff.

“Our workforce is our biggest asset, which is why we invest in them,” says Calladine.

well as the number of older people developing complex needs later in life and a growing population of people experiencing complex and enduring mental health conditions.

“We care for adults with a wide range of complex mental and physical health conditions. We are seeing an increase in referrals for people with complex dementia and behaviours that challenge – and we expect this group will grow over coming years,” says Calladine. “Our homes have the experience, expertise and high staffing levels to provide quality care that supports them to live an enriched life and to flourish.

“When someone is referred to one of our homes, we carry out a person-centred assessment of need. This assesses 16 different domains of care across a spectrum of clinical, social, physical and psychological needs, working with the service user, their family and other professionals to identify how best their full range of needs can be supported. Getting the

right ‘community fit’ for every service user is imperative.

“It is heart-breaking to see people who have failed at one or, sometimes, multiple placements, often because at other homes the staffing levels and specialist clinical support are not quite right to meet their needs.

“The cycle of failed placements can lead to people’s condition and presentation of behaviours worsening because of the unsuitable environment they’ve been placed in. Then the home cannot cope and serves notice, which is upsetting and can have a long-term impact on that person.”

Exemplar Health Care nursing homes have a well embedded set of core values that were designed by members of staff and service users. Regular forums are held where service user ambassadors have a strong voice in how their home and the wider company is run.

“The social and community aspect of the care is a strong feature, with our service users being well integrated in the local community. Although our service users have very complex and high acuity needs, the high level of care and nursing staff enables them to maintain their community engagement and continue to use local services and amenities”.

Each Exemplar Health Care home has a life skills and activities team, as well as access to a wide range of clinical experts including behaviour support specialists, physiotherapists, psychiatrists and occupational therapists.

“Care should not be about a revolving door back into more acute settings.

We learnt recently of a person who displays behaviours which challenge that escalated to the point of him being admitted to a secure mental health hospital because he did not receive the right care and was not in the appropriate environment to meet his needs. He’d had a few months of lower cost and less specialist care but ended up in a hospital at a huge cost. Following this path is a false economy and, more importantly, it can cause significant distress and trauma to people.

“We care for some of the most complex and acute individuals, who would often be in a hospital setting if not placed with us. Exemplar Health Care enables people to stay in the community, reducing readmissions to hospital and other secure facilities.”

Exemplar Health Care’s focus on establishing and delivering personalised, holistic care in a friendly, community-based setting has paid dividends with a string of accolades. Some 27 colleagues have been selected as regional finalists in the 2021 Great British Care Awards, while the company has been shortlisted in the Care Employer Award category, for its “commitment to making every day better for the people we support”.

For more information please visit exemplarhc.com



Commercial feature

“It is about a person receiving the right care, in the right environment and from the right team so they can achieve their potential and live their best lives

DNA SCREENING

The truth about DNA testing kits

Consumer genetic tests reveal a range of health traits, from kidney disease to the potential for hair loss. But how reliable are the results?

Charles Orton-Jones

There’s something thrilling about seeing your genetic results for the first time.

Just to gaze at the raw data – the swirling list of adenine (A), cytosine (C), guanine (G), and thymine (T) – is to see the very code for your physical form.

It’s a spiritual moment – but it’s also a time to consider your health. DNA testing is now a mainstream healthcare tool. Major providers interpret the findings to offer a long list of healthcare insights. You’ll see at a glance if you have the genes for Tay-Sachs disease or cystic fibrosis.

There are many providers, including Helix, Bio-Synergy, and Nebula Genomics. The biggest provider is 23andMe. Spit into a tube, post it and two weeks later the 23andMe app offers around 100 health insights. These include 14 health genetic factors, 45 reports on carrier status – genes that may affect your children – and 37 traits such as the chances of having dimples, dandruff, toe length, early hair loss and eye colour.

The health information is rich – and sometimes disturbing. DNA tests reveal the presence of genetic variants associated with chronic kidney disease, hereditary haemochromatosis, and the dreaded BRCA1 and 2 variants for breast cancer, among others. The actress Angelina Jolie underwent a precautionary double

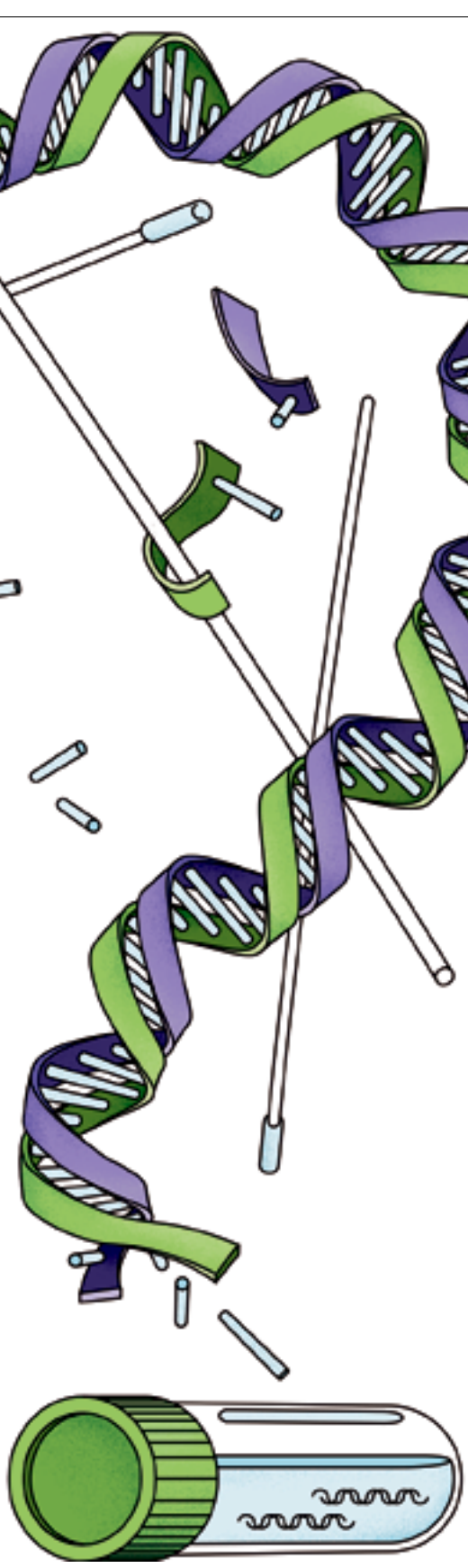
mastectomy following a genetic test for breast cancer.

It’s a growing trend. More than 10 million people globally have taken the 23andMe test alone. So should we all be taking a DNA test? And if the results are so profound, why doesn’t the NHS offer such services?

“The bottom line is I haven’t done it myself,” says Sara Brown, a professor at the University of Edinburgh specialising in the genetic causes of disease. “That should tell you something about how highly I value it. We’re all keen to have the equivalent of a crystal ball. So I can totally understand why people want to do it. But would I ever recommend it to a patient? I wouldn’t.”

Brown explains that genetics is almost always too complex to be reduced to a set of results delivered via an app. “The uncertainties make it really difficult to recommend for a specific question.” For example, look at the likelihood of contracting a disease: “If you have an 80% risk, you’ve got a 20% likelihood you won’t get it. How then do you use that information in your everyday life?”

Factor in lifestyle, environment, and myriad other genetic variables, and the gap between genes and real-world outcomes become perilously uncertain. “Very, very few diseases are a single gene,” she warns. “The vast, vast majority of human diseases are related to multiple genetic effects



comprehensive information. These are “single gene” disorders, such as alpha-1 antitrypsin and haemochromatosis. But these “single gene, single disease” examples are rare. For other conditions, the company emphasises the complexity of the job in hand. “For breast cancer, the test is not conclusive,” says Onyejekwe Jr. “We don’t claim that it is. But it does expand the coverage beyond what any traditional health care is covering. So there’s value in that.”

23andMe holds back on publishing a wide range of potential genetics links on the app as the medical research is under the confidence threshold. The company also provides a treasure trove of information, including links to original research, to help consumers understand the nuances of their results.

Other providers are more adventurous. For example, epigenetics is the science of how DNA is expressed. Providers such as Bio-Synergy claim to be able to calculate your biological age compared to your chronological age via epigenetic testing. “It’s methylation,” says Brown, referring to the epigenetic mechanism that regulates gene expression. “And changes in methylation are up to 97% accurate at predicting your biological age, especially in younger people.” Smoking, for example, is visible at the epigenetic level. So it’s an informative and scientifically valid service.

Daniel Herman, the founder of Bio-Synergy, is confident his DNA and epigenetic service passes the threshold of reliability. “We demand a minimum of five peer-reviewed published studies before we incorporate the science,” says Herman, noting that the company’s head of nutrigenomics, James Brown, has a PhD, while it also works with other parties on the data.

Providers push different interpretations depending on their reading of the science. Bio-Synergy, for example, claims to be able to detect the likelihood of vitamin deficiencies due to

“For breast cancer, the test is not conclusive. But it expands coverage beyond what any traditional healthcare is covering

DNA, and sells vitamin drips to counteract this. This is more speculative, says Brown. “There are rare metabolic abnormalities,” she says, “but those are very rare and evident throughout childhood.” Bio-Synergy points to research to support its claims.

Genetics is a very complex area. Interpreting results beyond a narrow range of disorders takes medical knowledge. Mercifully, the main providers of these services are keen to stress this, and if anything err on the side of caution.

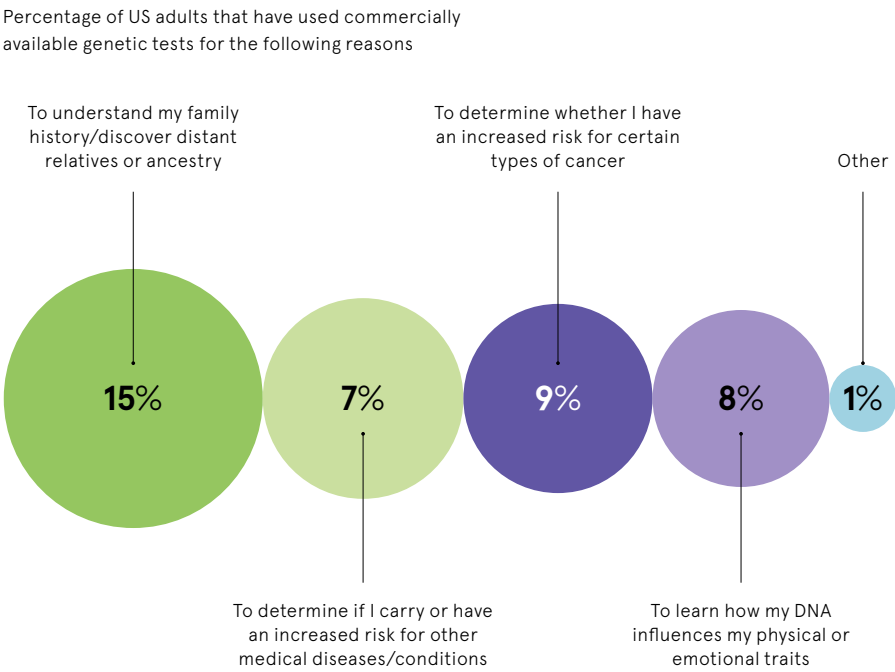
The real is for science as a whole. As anonymised DNA data is shared, along with survey data collected by test providers, research scientists are reaping the benefits.

“I’ve used research data from 23andMe,” says Brown. “The company shares its collected genetic testing with researchers and I’ve benefited from this.” Brown says the company’s numbers “blew out of the water the numbers from other sources. Genetics is about numbers, it’s about probabilities. We need bigger and bigger numbers. And that’s what we get through resources such as 23andMe.”

For the individual, the results are fascinating. But the bigger payoff is for scientists. Massive datasets will eventually unlock the secrets of the genome. Over time, the insights gleaned from this data will get better and better.

DNA tests are thus the future of healthcare, just not quite in the way the consumer may envisage. ●

HOW PEOPLE ARE USING DNA TESTS American Society of Clinical Oncology, 2018





Print media can't generate leads. Wrong.

Some of the advertisers in this report will generate over 200 leads thanks to Raconteur's integrated print and digital campaigns.

Email enquiries@raconteur.net to find out more.

RACONTEUR

MEDICAL TECHNOLOGY

How digital twins could transform healthcare

Digital twins could have life-changing effects, impacting everything from clinical trials to bed management. However, there are challenges ahead for the virtual technology

Rich McEachran

Digital twins are familiar tools in engineering and manufacturing. However, scientists are now deploying the technology in the medical realm, modelling the effectiveness of existing drugs against new diseases.

Scientists and medical researchers often seek to treat patients by examining the efficacy of existing drugs. That's what happened when Covid-19 first arrived. Global analytics company Elsevier and ExactCure, a startup providing software solutions

to reduce the impact of inaccurate medication, came together in April 2020 to build a digital twin that could model patient reactions to 20 approved drugs.

But what is a digital twin? In essence, they're virtual representations and simulations of a physical asset or entity. For example, pharmaceutical giant GSK has piloted a replica of its vaccine production process to improve operations and future vaccine development.

The digital twin from Elsevier and ExactCure was designed to simulate the impact individual drugs would have on the bodies of patients with certain physical, genetic and medical characteristics. The data gleaned from the digital twin could be used by physicians to personalise future treatment plans and doses for patients infected with SARS CoV-2, the virus that causes Covid-19.

Much like engineers use digital twins to safely test the impact of maintenance work, the technology could allow physicians to make clinical decisions in a safe environment.

"One of the biggest benefits of digital twins is the speed at which they can enable us to model reactions, without involving humans or animals," explains Dr Olivier Barberan, director of translational medicine solutions at Elsevier. This means that when there's a public health crisis, "we can use data already available, with no risk to life, to understand the disease and how it interacts with already approved drugs to start fighting it as quickly as possible."

Understanding the impact of a particular drug on a patient before it's administered could ensure better

“One of the biggest benefits of digital twins is the speed at which it can enable us to model reactions, without involving humans or animals

care, outcomes and quality of life, says Dr Frédéric Dayan, co-founder and CEO of ExactCure.

Health professionals will start to rely on simulated and visual models of treatment plans over the next decade or so, according to Dayan. "We will see digital twins move from an R&D tool to one that empowers patients," he adds.

Digital twins could also be used to eliminate – or at least reduce – the need for placebos in clinical trials. Often when there's no standard treatment for a disease, patients might be given a placebo made from a harmless substance like sugar or starch. While placebos are considered an important part of clinical research, they're "ethically questionable," says Dr Gen Li, founder and CEO of Phesi, a virtual clinical trials company.

"The need to remove the use of placebos is especially relevant when patients are in chronic and severe pain or where there's enough historical placebo data from previous trials," he adds.

By using digital twins, medical researchers could define the type of patients that should be included in a clinical trial and those that should be excluded based on certain characteristics. They could then predict outcomes and side effects in real patients. The end result would be trials with fewer participants.

"Working towards eradicating the use of placebos and reducing the patient burden should be an industry-wide goal," Li argues. "Digital twins will help us to reach this goal faster and we expect to see considerable advances over the next five to 10 years."

There's no doubting the life-changing potential of digital twins. The Living Heart Project, led by Dassault Systèmes, was launched in 2014 to develop the world's first model of a human heart. Healthcare specialists, regulatory bodies and medical device manufacturers are working together to boost the effectiveness of cardiovascular treatment.

Partnerships between the public healthcare sector and technology companies will be crucial if digital twins are to be adopted more widely. Some NHS trusts are already partnering with simulation specialists to implement digital twins in bed management. Manual patient flows are often paper-based and inefficient; forecasting demand for beds enables healthcare workers to optimise capacity and reduce patient wait times.

But budgets and resources are stretched for most hospitals. The more pressing matter for hospitals right now is tackling the backlog of

people waiting for check ups, tests and scans. Rishi Sunak, the chancellor of the exchequer, pledged £5.9bn to the NHS in the October budget to accelerate the use of digital technology in healthcare settings and to reduce waiting lists.

There is also the issue of public trust. Research from the Information Commissioner's Office, published in June, found that three in four people have high trust and confidence in the NHS. However, 47% would be comfortable with the NHS sharing health data with public sector companies if it were to improve treatment, while only 42% would be happy for data to be shared with private sector companies.

Every hospital could one day have a digital twin for every patient to treat any disease, but this "seems like a fantasy and is unlikely to come to fruition in the next 20 to 30 years," Dayan stresses. For it to happen, all hospitals would need to be implementing digital twins and sharing data to not only personalise treatment and care plans but to advance the applications of digital twin technology. This would require full public trust.

"We don't yet have the quality of data to address each variable in the entire body to create an accurate full body digital twin," says Dayan. "But once we have enough accurate and reliable data, it could become a reality." ●

ANOTHER USE FOR DIGITAL TWINS

After creating a digital twin of its radiology department and testing it under different scenarios, Mater Hospital in Ireland achieved the following results:

24 minutes

reduced waiting and turnaround times

50 minutes

reduced time needed to process scans, per day

32%

improved machine utilisation

PA Consulting, 2021



NHS charts an innovation revolution

The NHS is beset with problems. However, these challenges could have an upside, driving a wave of staff ingenuity in everything from hygiene to treatment

Danny Buckland

Critics fear that the NHS is straining, weighed under by the pandemic and soaring demand. These pressures are real – but they also fuel innovation.

Faced with incessant challenges, everyone from cleaners to consultants are examining ways of improving the service. Bright ideas from hard-pressed staff are now revolutionising healthcare delivery, with staff deploying ingenuity and invention to solve problems. Welcome to the NHS's innovation revolution.

The NHS deals with more than 1 million patients every 36 hours. Its 1.5 million staff face a treadmill of demand, including 16.25 million hospital admissions and 23.3 million accident and emergency unit attendances every year.

But against a backdrop of rising service demand and tightened finances, they're devising hundreds of innovations. These range from workflow tweaks to treatment breakthroughs that are transforming care and improving efficiencies.

Despite the frenetic pace of daily NHS life – intensified by the pandemic – the health system has created a progressive culture of change. Staff are encouraged to come up with ideas, then offered support to scale and grow projects.

Hospitals around the country are benefitting from such initiatives, including a one-stop prostate cancer clinic, an artificial intelligence (AI) system that speeds up diagnoses and an app that minimises maintenance issues that can hamper surgery. A group of hospital domestic staff also devised a better way



Wiktor Szymanowicz/Barcroft Media via Getty Images



peterspiro via Getty Images

THE PARTNERSHIPS BEHIND THE INNOVATION

The UK's 15 AHSN, which partner with the NHS to create the Innovation Accelerator

1. UCL Partners
2. Imperial College Health Partners
3. Health Innovation Network South London
4. Kent Surrey Sussex Academic Health Science Network
5. Wessex Academic Health Science Network
6. South West Academic Health Science Network
7. West of England Academic Health Science Network
8. Oxford Academic Health Science Network
9. Eastern Academic Health Science Network
10. East Midlands Academic Health Science Network
11. West Midlands Academic Health Science Network
12. Health Innovation Manchester
13. Yorkshire & Humber Academic Health Science Network
14. Innovation Agency – Academic Health Science Network for the North West Coast
15. Academic Health Science Network North East and North Cumbria

of using cleaning fluids to improve hygiene and save money.

The bright ideas are curated by the NHS Innovation Accelerator (NIA), which promotes and guides promising initiatives through the health system's bureaucracy so they can deliver benefits to patients. Over the last six years it has helped raise £188m in external funding for innovations that are now used at 2,718 NHS sites and have saved the health service more than £40m.

"Who is better to create solutions than the people who work in the NHS every day and see where the problems are?" says NIA interim deputy director Maria Kyriacou. "These innovations show that the NHS and the people who work in it are doing everything they can to help the nation's health."

Individuals are coming forward with fresh ideas and smarter, more

efficient ways of dealing with issues, Kyriacou says, "and they are getting results. It is lifting the load off everyone in a system that is already working so hard."

Orthopaedic surgeon Ash Kalraiya founded MediShout through the NIA, developing a digital platform for clinicians to report problems and use AI to predict future issues. The idea came after he was forced to cancel three operations due to a broken lightbulb in the operating theatre and delay another because he had to fix a faulty printer at a London hospital.

"It allows hospitals to resolve the small logistical problems that have huge consequences for staff and patients," adds Kyriacou. "It is saving £1m a year in efficiencies and is now being rolled out at some of the largest UK hospitals. It's just one example of the creativity and solution-based focus NHS staff possess."

NIA's support includes mentoring and learning programmes. There are also networking opportunities, helping to get innovations adopted across the NHS's complex structure of 207 clinical commissioning groups, 206 health trusts and 1,229 hospitals around the UK.

There are routes through this crowded and often disjointed market, signposted by 15 regional Academic Health Science Networks

“

Who is better to create solutions than the people who work in the NHS every day and see where the problems are?

(AHSNs), which connect the NHS, academic research institutions, local authorities and charities. The network is hosted by the innovation catalyst UCLPartners, which also acts as a mediator between NHS and industry.

The aim is to spot innovations that can impact the health and care system, helping to scale them up across the NHS to become businesses. In 2020-21 it supported 2,888 companies and leveraged £462m of investment while creating 700 jobs and safeguarding 763 others.

"We have to innovate our way out of the pandemic by working in a different, smarter way," says Professor Gary Ford, chair of the AHSN Network and chief executive officer of Oxford AHSN. "NHS innovation is often focused on the way we work and using approaches like digital tools to transform care pathways to meet the needs of patients. The people that best understand those needs work in the NHS."

Many parts of the health service are good at supporting people to develop their ideas within their own unit. The big challenge comes in spreading this around the organisation, says Ford. This is why AHSNs were created.

"We provide the right environment for innovators to work in the NHS and develop their ideas and curate them so they can be adopted more broadly."

London's Chelsea and Westminster Hospital NHS Foundation Trust collaborates with its charity CW+ to run the CW Innovation programme, which tests and scales staff-led projects that improve patient care and hospital efficiencies.

It co-developed ISLA imaging technology, which remotely diagnoses rashes, wounds and skin conditions

and has been rolled out across north-west London. The Trust also co-developed a real-time algorithm for Covid-19 patients, predicting their risk of ICU admission, the need for mechanical ventilation and in-hospital mortality.

"Digital innovation is front and centre at the Trust," says Chris Chaney, chief executive of CW+. "Our internal infrastructure, entrepreneurial culture and growing partnerships with external organisations have all provided solid foundations for us to be able to respond quickly to the evolving needs of our patients and staff."

The pandemic continues to put enormous pressure on the NHS, Chaney adds. More than ever, the service must embrace new ways to care for and treat patients as efficiently and effectively as possible.

"One of our Trust's values is 'determined to develop' and we are extremely proud of our entrepreneurial teams who demonstrate just that and remain committed to maintaining momentum and driving a future of ongoing transformation not just at our Trust but across the NHS," he says.

At Frimley Health NHS Trust, urology clinical specialist nurse Tanya Gill was instrumental in improving care for prostate cancer patients by creating a one-stop clinic. The 42-year-old noticed that patients often had to make repeat visits as they were processed through a slow, laborious system.

"Patients were waiting longer to find out if they did or did not have cancer and that is very distressing," she says. "They were facing lots of visits with parking charges and invariably had to repeat what was wrong with them to a new clinician every time they came."

With the backing of her line manager and consultant, Gill reworked procedures so patients could go from initial meeting through MRI scans and potential biopsies to diagnosis in just one day, which has resulted in faster diagnosis rates and greater efficiency.

Consultant radiologist Dr Thomas Naunton Morgan devised Nighthawk – the out-of-hours radiology reporting system that provides diagnostics during peak periods – while working at West Middlesex University Hospital. He continued to develop AI systems, founding behold.ai, a company that has created an algorithm that can spot abnormalities in images, saving clinicians time and reducing backlogs.

Innovation from NHS staff is pumping through every artery of the health system. With waiting lists standing at 5.7 million and predicted to lengthen, the NHS needs its staff to maintain their dedication and ingenuity. ●

2,718

NHS sites are using innovations developed by the NHS Innovation Accelerator

£188m

in external funding has been raised by the NHS Innovation Accelerator since its inception in 2015

NHS Innovation Accelerator, 2021

Put the power of six leads in your pocket with KardiaMobile 6L



KardiaMobile 6L runs on the most sophisticated AI ever brought to a remote cardiac monitoring device – able to detect more arrhythmias than any other personal ECG, with no wires, patches or gels.

It's the world's only six lead personal ECG, giving you more data than ever before with six views of your patient's heart. Record a medical-grade ECG and detect common arrhythmias, including Atrial Fibrillation. Get instant results right on your smartphone, so you know what's going on with your patient's heart the moment they feel a symptom.

alivecor.co.uk

AliveCor
KardiaMobile 6L

If you want to deliver a better patient experience.



We should talk.

Talkdesk is the trusted
contact centre solution built
for healthcare providers.

:talkdesk®

Experience. A better way.

talkdesk.com