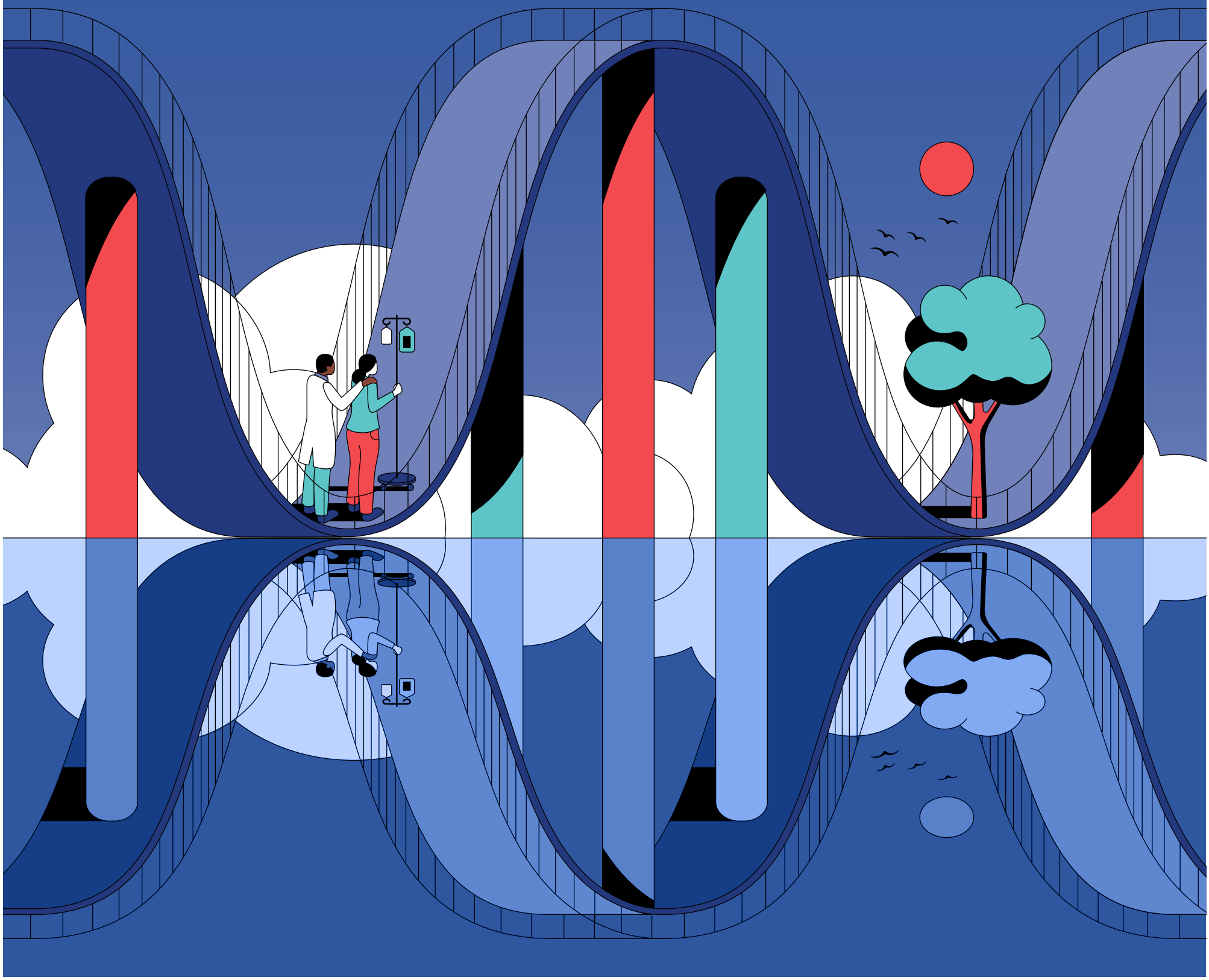
COMBATING CANCER



COMBATING CANCER

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STRATEGY

The Covid effect: clearing the cancer backlog

As exhausted NHS staff struggle to reduce a pile-up of cases caused by the pandemic, the government is facing calls for a radical rethink of services

Peter Archer

The Covid crisis has caused delays to cancer treatment in the NHS that look set to result in thousands of extra deaths.

The true number of cancer casualties that can be attributed to the pandemic will only become clear in the medium term, but one estimate by University College London and DATA-CAN: The Health Data Research Hub for Cancer puts the additional UK death toll at 18,000 over the next 12 months.

Research by DATA-CAN also indicates that 70% of people exhibiting suspicious symptoms during the first wave of the pandemic in 2020 weren't referred to specialist cancer services, while 40% of chemotherapy treatments were delayed.

The Department of Health and Social Care (DHSC) says that cancer treatment has remained a top NHS priority throughout the Covid crisis. Most patients referred by a GP will see a cancer specialist within two weeks, the DHSC claims, while more than 2 million urgent referrals have taken place and 570,000 people have been receiving treatment since the pandemic began.

In March 2021, the number of urgent referrals by GPs for cancer treatment in the UK was the highest monthly total on record. There were more than 232,000 referrals in all – up 26.4% on the figure for March 2020 – equating to more than 10,000 new cancer patients each working day.

But an estimated 3 million fewer people than normal were screened for cancer between March and September last year, according to Cancer Research UK. As a result, about 9,200 fewer patients started cancer treatment in England alone, while 45,000 fewer cancer patients were diagnosed or treated between March 2020 and March 2021.

38.7

percentage-point increase in the proportion of patients in England waiting more than six weeks for an endoscopy (which is used to screen for cancer) at the end of December 2020, compared with 2019

NHS England, 2021

FatCamera via Getty Images

> **We fear that cancer survival rates will decline for the first time. There are lots of people out there who have cancer but don't know it**

Another way of measuring the impact of Covid is that there were 330,000 fewer GP urgent referrals between March 2020 and March 2021 – 13% down on the figure for the preceding 12 months – creating a backlog that overstretched NHS staff are struggling to clear.

"The impact of the pandemic on cancer has clearly been devastating," says Cancer Research UK's head of policy development, Kruti Shrotri. "We fear that cancer survival rates will decline for the first time. There are lots of people out there who have cancer but don't know it."

Clare Turnbull is an NHS consultant and professor of translational cancer genetics at the Institute of Cancer Research in London. She reports that people who were too scared to visit their GP surgery or hospital for fear of contracting Covid have been presenting later with worse symptoms and more advanced cancers, which tend to be harder to treat.

"We can expect that the resulting delays to diagnosis and treatment will lead to a substantial number of avoidable deaths across different cancer types in coming years," Turnbull predicts.

Any significant delay in presentation, diagnosis or treatment could make a crucial difference, she adds, referring to cases in which patients miss the window for their cancers to be detected and treated while still curable, allowing them a normal life expectancy.

"The danger is that, if you do pass beyond that window, your cancer turns out to have progressed and is no longer curable," Turnbull says.

A modelling exercise covering 20 cancer types early in the pandemic showed that, if each patient proceeding along the urgent referral pathway experienced a total delay to their treatment of one month compared with the normal timetable, this would result in 1,400 extra deaths a year and 25,800 life years lost. A six-month delay, Turnbull adds, would result in 9,300 extra deaths and 173,500 life years lost

The total delay experienced by each patient with a potentially curable cancer is hard to determine, as it's the sum of a combination of delays in obtaining the following: a appointment with a GP; a referral to an oncologist; diagnostic tests; additional and often complex imaging studies to work out the severity of the case; surgery; and any chemotherapy or radiotherapy accompanying that surgery.

"The data that's coming through is showing, as predicted, an upward shift in the stage at which cancers have been diagnosed over the past 14 months. We know that this will equate to more deaths," says Turnbull, who adds that NHS staff have worked tirelessly to

40,000

fewer people started cancer treatment in the UK during 2020, compared with a typical year

Cancer Research UK, 2021

reinstate cancer services as quickly as possible. Despite this, there's still a substantial backlog of patients awaiting outpatient appointments, investigations and surgeries.

There have been about 40,000 fewer cancer diagnoses in the NHS than normal during the past 14 months, according to Turnbull, so the service is likely to be dealing with many more cancer presentations than normal over the coming months, while also working at 80% of its usual capacity owing to social distancing and other measures to control infection.

"Covid-19 has caused an acute-on-chronic crisis in cancer care," she says. "During the rise of the pandemic in 2020, unprecedented pressure on hospital beds and intensive care units, the redeployment of staff, caution regarding transmission in hospitals, reduced access to primary care and the lockdown combined in a perfect storm, dramatically disrupting care pathways. But cancer outcomes in the UK were already deteriorating compared with those in other countries in the Organisation for Economic Co-operation and Development. This had resulted from worsening capacity problems relating mainly to shortages of cancer professionals in the NHS, including nurses, doctors, surgeons, radiographers, clinical scientists and pathologists."

Lung and prostate cancer cases in particular are going undiagnosed, according to Shrotri, who adds: "A cough may be a sign of Covid, but it could be lung cancer."

Breast cancer treatment has also been affected by the postponement of screening programmes. Many cases will have gone undiagnosed as a result. The UK has screening programmes for breast, bowel and cervical cancers. Because of Covid, invitations and follow-up appointments have been delayed.

But surgery has been hardest hit by the pandemic, as Shrotri notes: "We saw a 40% drop in the number of surgeries, mainly because of the need to prioritise intensive care beds for Covid patients. There's never a good time to have cancer, but a pandemic is a bad time. Many patients thought that they'd been forgotten."

She adds that it has been "devastating to see diagnosis and treatment paused and delayed. Over the past couple of months, more people than normal have been coming through the system, so the NHS is starting to tackle the backlog, but there's a very long way to go."

Building back smarter

Mark Lawler is professor of digital health at Queen's University Belfast and DATA-CAN's scientific director. He says that its research suggests that the NHS's cancer services need to be operating at a far higher capacity than they were before the pandemic to redress the balance.

"Getting back to 100% is not enough," Lawler argues. "It's soul-destroying when you can see the numbers and every one of these represents a person."

He adds that, while the pandemic has shown that the nation's cancer services are not as resilient as many people had thought, "this is a huge opportunity to reimagine these services and build them back smarter using data with an innovative approach".

Lawler, who also co-chairs the European Cancer Organisation's special network on Covid-19 and cancer, believes that the backlog calls for a pan-European solution.

The organisation is planning to address that backlog by: restoring confidence in cancer health services; tackling medicine, product and equipment shortages; filling gaps in the cancer workforce; employing innovative technologies to strengthen cancer systems and provide optimal patient care; embedding data collection and the rapid deployment of cancer intelligence to enhance policy delivery; and securing and sustaining deeper cooperation across Europe.

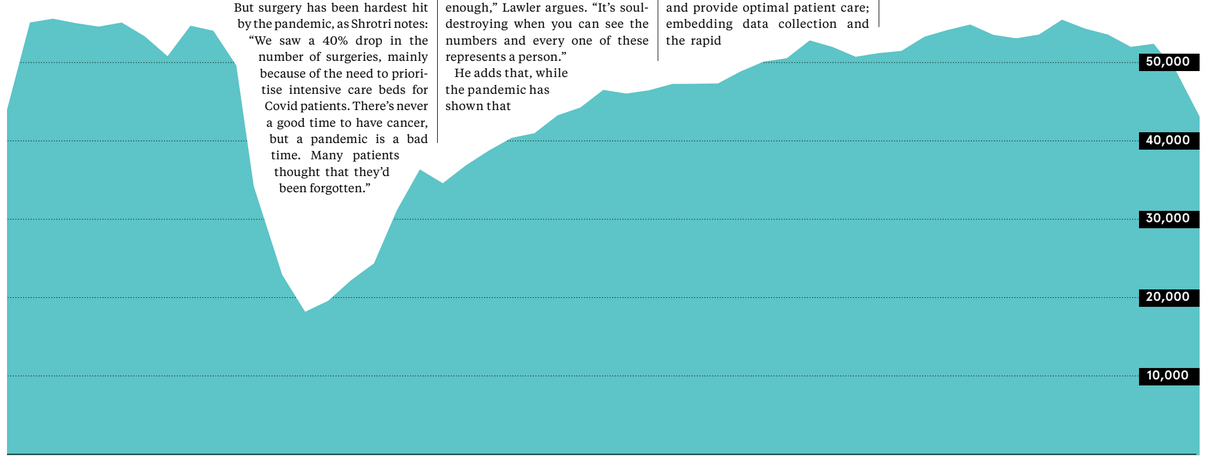
"It's very much a pan-European plan rather than a EU plan. Cancer knows no borders," Lawler says.

Turnbull adds: "It is a grave mistake to believe that these issues can all be solved by a year or two of extra funding for 'Covid recovery'. We desperately require a long-term cross-party plan for cancer care to allow us to turn around the downward trajectory of our cancer outcomes. Only then can we ensure that we have cancer services that we can be proud of on a normal day, but which are resilient to future disruptors, be they seasonal flu outbreaks or the next pandemic."

THE NUMBER OF URGENT CANCER REFERRALS SLUMPED IN 2020 AS THE PANDEMIC HIT

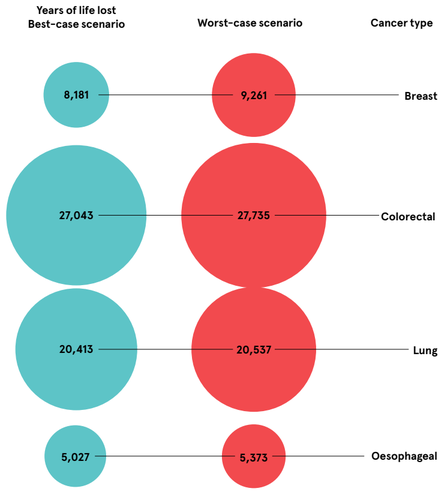
Weekly number of urgent (fortnight wait) referrals to hospitals in England for any type of cancer

NHS England, 2021



COVID-19 IS EXPECTED TO HAVE SIGNIFICANT RAMIFICATIONS FOR UK CANCER SURVIVAL RATES IN THE MEDIUM TERM

Estimated years of life lost from additional deaths owing to cancer at five years from diagnosis for two pandemic scenarios: best case and worst case



The Lancet, 2020

> **We hope that the pandemic will prompt the reconfiguration of cancer services to better protect future delivery in the face of the next crisis**

Professor Charles Swanton, chief clinician at Cancer Research UK, argues that building back should also mean levelling up, addressing "unacceptable long-standing cancer inequalities" across the country that equate to about 20,000 more cancer cases every year.

Swanton explains: "There have been huge breakthroughs over the past decade in life-saving cancer research – in immunotherapy, for example – but now we need the breakthroughs of tomorrow."

He adds that significant investments are required in several areas, including new equipment, primary care, rapid diagnostic centres and the clinical researchers who will help to deliver the breakthroughs.

"If the right approach is taken, the UK can emerge from this pandemic with a cancer care pathway that is more innovative, more flexible and better equipped to save more lives," Swanton says.

We have learnt much from our lack of readiness for the Covid-19, according to Turnbull. She says that key elements of pandemic planning in the future will include defined protocols and processes to protect cancer patients and healthcare professionals from infection, along with rational prioritisation for delivering medical procedures.

"Cancer pathways are complex and thus fragile. We need to ensure that they remain resilient to extrinsic disruption in future," Turnbull says. "Other countries have shown that standalone facilities can help to maintain cancer services alongside overburdened hospitals. We hope that the pandemic will prompt the reconfiguration of cancer services to better protect future delivery in the face of the next crisis."

The DHSC says: "The NHS has published its plan to recover cancer services. We're providing an extra £1bn to boost diagnosis and elective treatment in the year ahead, as well as investing £325m in NHS diagnostic machines to improve the experience of cancer patients."

The government response is led by Professor Peter Johnson, national clinical director for cancer. He chairs the cancer recovery taskforce, which reports to the National Cancer Board. The board oversees the delivery of the *NHS Long Term Plan*'s goals to diagnose 75% of cancers at stage 1 or 2 and for 55,000 more cancer patients to survive for five years or more by 2028.

NHS operational planning guidance from March 2021 has set a target for elective treatments to return to 85% of 2019-20 levels by July 2021 and for this to rise thereafter. The aim is also to meet the increased level of referrals and treatment required to address the shortfall in the number of first treatments by March 2022.

A three-pronged assault on cancer

Leading global healthcare company GSK is applying a new culture-led approach in its efforts to improve oncology outcomes. Its UK and Ireland oncology medical head, Dr John Fleming, sets out how

The multiplier effect of science, technology and culture is the ethos now underpinning research and development at GSK, explains Dr John Fleming.

As a post-Covid world faces up again to the challenges of cancer, GSK is poised to leverage its new "power of three" strategy that embeds a crucial cultural shift into the science and technology of R&D.

Dr Fleming explains: "It's about driving the probability of success. Having the best technology and science achieves nothing, actually, if you can't translate that into medicines that can reach patients."

Already evident on the science and technology side of the strategy are the advances in significant R&D pathways. These include the development of immuno-oncology beyond its historical reliance on blockade, evolving it to better harness technologies that leverage the power of the human immune system, as well as solid tumour cell therapies, cancer epigenetics – which centres on the manipulation of gene expression – and an approach known as synthetic lethality.

However, it is the addition of the cultural shift that positions GSK ideally for the cancer challenges ahead, believes Dr Fleming. Changes such as a move to smart risk-taking – focusing resources in specific areas that are most likely to succeed – are perhaps epitomised by corporate developments. This includes acquisitions of carefully selected oncology biopharmaceutical partners like TESARO, as well as new global research collaborations with leading cancer hospitals like the Royal Marsden and others in development.

Add in talent development and single accountable decision making, and you have the ingredients for a new disease-agnostic approach to R&D, says Dr Fleming, one which looks at how new technologies can contribute across a range of diseases, as well as creating fertile ground for the development of innovative modalities such as small molecules, antibodies, cell therapies and antibody-drug conjugates.

> **When you have great technology, great people, and a very powerful empowering culture and you put all three together, it really is unique**

"When you have great technology, great people, and a very powerful empowering culture and you put all three together, it really is unique," he explains.

For Dr Fleming, new thinking in the way services are delivered post-Covid – moving to "super-centres" that co-locate experts and diagnostic services in one very specialist location – could play a crucial role in achieving that all-important early cancer diagnosis. "The ideal outcome is for the pathway to be as short as possible so that once a patient is diagnosed, they get the most appropriate treatment at the right time and we can help this happen through improving collaboration between the NHS, pharmaceutical companies and reimbursement bodies."

Post-Brexit, new clinical associations outside Europe, such as Project Orbis, an initiative of the US Food and Drug Administration Oncology Center of Excellence (OCE), will also support service delivery through innovative and more timely licensing. Dr Fleming explains: "It's important to understand that we are not just looking at licencing new medicines, but also new technologies, which require a very different way of looking at how you appraise cost effectiveness – so I do see this as an opportunity for the UK."

So does all this mean we are close to a cure for cancer? "Everyone wants to cure cancer, but it's very difficult to say that as a statement with a full stop and leave it there," says Dr Fleming. "This is because cancer is not one, but thousands of diseases. But what we are getting better at is segmenting these diseases, not just by organ but by genetic aberration."

For example, recent significant increases in survival with multiple myeloma possibly predict a time when certain cancers will become well-managed, life-long conditions, much like HIV today.

Dr Fleming says: "If you can detect cancer early enough and are able to offer targeted therapy that's best for each patient, whether existing or new, then that's where the future lies for me. And it's a very exciting one for patients and for oncology as a whole."

For more information please visit www.gsk.com

DETECTION

Ovarian cancer screening disappoints, but lessons remain

A trial has found that screening doesn't save lives, but the research has still taught experts much about the disease

Natalie Healey

Ovarian cancer is often referred to as a silent killer. Its symptoms – abdominal bloating, for instance – are vague and easily confused with those of non-life-threatening conditions such as irritable bowel syndrome.

About 4,000 people in the UK die from ovarian cancer every year, according to Cancer Research UK. There is currently no national screening programme for detecting the disease, which mainly affects post-menopausal women.

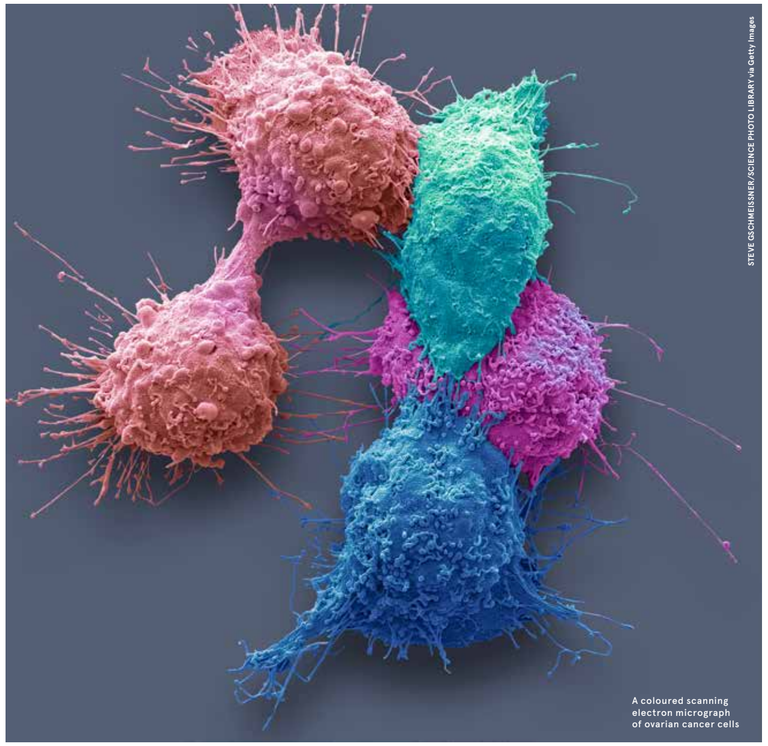
In 2001, researchers hoped that they could change that and save thousands of lives when the UK Collaborative Trial of Ovarian Cancer Screening (UKCTOCS) began following more than 200,000 women aged 50 to 74 from the general population. Participants were screened annually with either an ultrasound of their ovaries or a blood test, alongside a control group that did not undergo any screening.

The results of this large-scale trial had been hotly anticipated, but in May the researchers concluded that screening had failed to reduce the death toll from ovarian cancer.

The project's lead researcher is Usha Menon, professor of gynaecological cancer in the Medical Research Council Clinical Trials Unit at University College London, who has been working to improve the detection of ovarian cancer since the mid-1990s. She says: "With this disease there is so much need. We'd thought that we might have the solution that would change things, but we were disappointed."

That means there won't be a recommendation for routine screening. Still, experts say there are plenty of lessons to take from the project.

About 90% of women diagnosed with ovarian cancer at the earliest stage (1) survive for five years or longer, but this figure plummets to 13% in cases where it's detected at the latest stage (4). Almost 60% cases are diagnosed at a late stage.



STEVE GSCHMEISSNER/SCIENCE PHOTO LIBRARY via Getty Images

A coloured scanning electron micrograph of ovarian cancer cells

> **I don't think ovarian cancer is the silent killer. I think it whispers. We've just got to work out how to listen to it**

Screening is designed to detect cancers as early as possible, when treatment is most likely to be successful. But a screening programme will be approved for use in the NHS only if it's known to save lives. The test also needs to reliably detect cancer or abnormal changes that could lead to the illness, as well as being cost-effective and acceptable enough for people to undergo it.

There is good evidence that the UK's early detection programmes for bowel, cervical and breast cancers satisfy all these criteria, but this is not the case for ovarian cancer screening.

"For all the lives a future screening programme might save, there are going to be quite a few women who have surgery for what turns out not to have been cancer," explains consultant gynaecologist Dr Adam Rosenthal, from University College Hospital. "You can't introduce general population screening with all the downsides until you're really certain that it's saving a substantial number of lives."

Although the UKCTOCS didn't show a survival benefit, some of its findings have given grounds for optimism. While annual ultrasound scans couldn't detect cancer earlier or save lives, researchers were able to find some cancers earlier than normal in women who underwent regular blood tests.

The test, which tracked levels of a chemical called CA125 that's released from ovarian tumours, picked up 39% more cancers at an early stage compared with the control group. As CA125 levels can vary between women, the researchers developed an algorithm that could determine how someone's levels changed over time. If their CA125 levels rose during the trial, they were referred for ultrasound scans.

Even a slightly earlier diagnosis can make a big difference to ovarian cancer patients in terms of treatment options and quality of life, says Tracie Miles, gynaecological cancer information nurse at the Eve Appeal. Detecting the disease at an early stage could mean less intense treatments, fewer hospital trips and more time with loved ones.

So why didn't early diagnosis save lives? It's still a mystery to the researchers. Menon says that it could be that screening did not pick up enough of these early cancers, or that they need to be detected even earlier to affect survival rates. But it's possible that the blood test used in the UKCTOCS might help women who are at high risk of developing the disease.

Some women possess a gene that makes them significantly more prone to ovarian cancer. Rosenthal has found that, by screening these women every few months, it might be possible to diagnose the disease before it reaches an advanced stage.

Regular surveillance could give them a damage-limitation option until they're ready to have a preventive operation to remove their ovaries. But Rosenthal stresses that the blood test is not an alternative to surgery, which is the only way of preventing ovarian cancer.

While the UKCTOCS results are disappointing, some experts view the study as an extraordinary piece of research that will help scientists design to future clinical trials.

"These trials don't always find the results that we hope for," says Sophia Lowes, health information manager at Cancer Research UK. "But the results of the UKCTOCS also clearly demonstrate how crucial it is to conduct such long-term studies, because it's the only way to know if screening can save lives."

And the research could live on. The participants gave permission for other researchers to use their data and blood samples, creating a rich database that might help scientists to determine whether new tests for early diagnosis perform better than those used in the study.

Researchers could also look for different chemicals in the blood that could suggest ovarian cancer. And the information might even help to further our understanding of how the cancer develops.

What's more, because the women in the UKCTOCS were followed for so long, some were diagnosed with other cancers. Their data and samples will also help researchers who are working on the early detection of other forms of the disease.

It's certainly not the end of the road for early detection in cancer care, according to Lowes. The NHS is currently trialling another blood test, developed by biotech company Grail, to see if it can detect hard-to-diagnose cancers (such as pancreatic and ovarian) among patients without symptoms.

The NHS hopes that the test could increase the proportion of cancers that are caught early – one of the main goals of its long-term strategy. But, until such methods show promise, most women with ovarian cancer will continue to be diagnosed only after they have gone to their GPs with symptoms of the disease.

"It is important that the results of the UKCTOCS do not discourage the testing of women with relevant symptoms," says Dr Garth Funston from the University of Cambridge, who studies the role that primary care can play in the early detection of cancers. "It is key that, as well as working towards developing an effective screening programme, we work to develop new approaches to ensure that women with symptoms are diagnosed and can receive treatment in a timely way."

Raising awareness of the symptoms will therefore play a vital role in reducing the death toll. Miles urges women – especially those over 50 – who are experiencing persistent bloating, unexplained bowel changes and/or abdominal pain to get checked out. She also advises anyone with a family history of ovarian cancer to speak to a GP, who might then arrange a genetic test.

"I don't think ovarian cancer is the silent killer," she says. "I think it whispers. We've just got to work out how to listen to it."

35%

of ovarian cancer patients in England and Wales in 2013–17 had survived for 10 or more years after diagnosis

11%

of ovarian cancer cases in the UK are preventable

Cancer Research UK, 2021

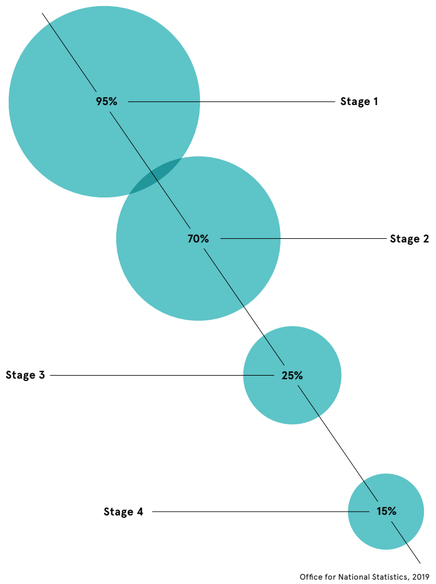
Cancer Research UK, 2021

7,443 new cases of ovarian cancer between 2015 and 2017 in the UK

4,182 deaths from ovarian cancer between 2016 and 2018 in the UK

SURVIVAL RATES FOR OVARIAN CANCER DECLINE THE LATER THE DISEASE IS FOUND

Age-standardised net survival rates in adults aged 15 to 99 in England between 2013 and 2017



Office for National Statistics, 2019

Commercial feature

Revolutionising cancer care through genetic testing

Early diagnosis and more targeted therapy is key to improving cancer survival rates, with genetic testing a new force in the fight against the disease

The revolution in genetic testing has created fresh hope that cancer treatments can be vastly improved by early diagnoses and targeted therapy.

Everything Genetic is at the leading edge of the movement bringing fast, accurate testing to the public so they can know and understand their disease risk. The UK-based company has established a suite of genetic services, which work via blood or saliva sample, that delve deep into the genome to deliver transformative data to patients who would otherwise struggle to discover how their family genetics influenced their health.

For some, the rapid testing can provide early warnings and appropriate treatment pathways; other tests offered could spare them chemotherapy treatment by identifying the risk of recurrence.

"Our mission is to democratise genetic testing," says Simon Davis, commercial director of Everything Genetic, which is based in Nantwich, Cheshire, and uses high performance laboratories within the UK and globally. "We're innovators of new technologies with the additional value to patients of offering a comprehensive clinical support from a top UK geneticist, all at an affordable price."

The company's tests, which range across breast, prostate, colorectal and melanoma cancers, can be purchased from as little as a family night out with results normally supplied within a fortnight. The company also has a NICE-approved breast cancer prognostic test that accurately identifies likelihood of cancer recurrence within the next 10 years, informing appropriate chemotherapy decisions.

The use of genomic technology to provide more precise diagnoses and the personalisation of treatment has been hailed by England's chief scientific officer, professor Dame Sue Hill as "probably the greatest revolution in healthcare this century".

The benefits were highlighted in a study by Professor Ranjit Manchanda, a leading oncologist at the Wolfson Institute of Preventive Medicine, Queen Mary University of London, which showed that broadening cancer BRCA gene testing to entire populations could prevent millions of cancers worldwide.

The research found that mass use of BRCA gene testing could prevent an additional 57,700 breast cancer cases and 5,900 breast cancer deaths, as well as 9,700 ovarian cancer cases and 5,900 ovarian cancer deaths in the UK.1

"Genetic information is the key to prevention but 90% of people with genetic mutations are still not aware of their elevated risk," says Davis. "We can unlock that information swiftly and, as the research suggests, this could have a huge impact on both an individual's health and the NHS's ability to treat cancer.

"Currently, the NHS will only offer you a genetic test if you have a high hereditary risk. We want the tests to become part of national screening, rather than there being such a high hurdle to access it."

A breakthrough recently launched by Everything Genetic examines single nucleotide polymorphisms, known as SNPs, to check for genetic errors that might have occurred when cells divide in two. This method of testing using PRS (polygenetic risk score) aggregates snippets of genetic information to give added clarity on risk and how to manage it.

"In isolation these SNPs are insignificant, but we examine up to 3,000 of them to provide a much clearer picture of disease risk," explains Davis. "This highlights comparative risk of developing a cancer compared to the general population, guiding patients to seek further intervention much earlier for those with an increased risk."

Everything Genetic provides clinical support for patients to interpret results and manage their concerns. They are developing further services to strengthen their influence across the patient pathway, from hereditary risk to clinical treatment options, across multiple cancer types.

Its client base is growing through hospital partners, corporate businesses and health insurance companies, as well as individuals who are using these cost effective and accurate services to improve their health.

"People have become more acutely aware of their health through the pandemic and realise that technology can help them manage it better," concludes Davis. "Predictive, polygenic testing will grow and become an integral part of the NHS because of its ability to identify and manage at-risk patients earlier that both improve their outcomes and save cost to the health economy."

> **People have become more acutely aware of their health through the pandemic and realise that technology can help them manage it better**

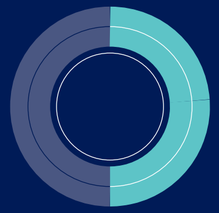
For more information please visit everythinggeneticltd.co.uk

everything genetic

SURVIVING CANCER

Cancer survival rates are generally increasing around the world, owing to improvements in the medical profession's understanding of the disease and advances in treatment techniques. But significant international variations remain – and the UK is being outperformed by several countries in key areas. What's more, the nation has some way to go to achieve Cancer Research UK's target of 75% of patients surviving cancer for at least a decade after diagnosis by 2034.

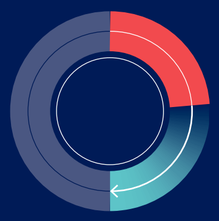
SURVIVAL



50%

Half of cancer patients in England and Wales survive for a decade or more after diagnosis

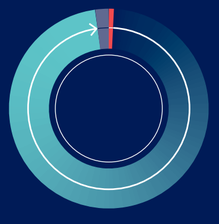
IMPROVEMENT



24%→50%

The cancer survival rate in the UK has more than doubled since the 1970s

VARIATION



1% - 98%

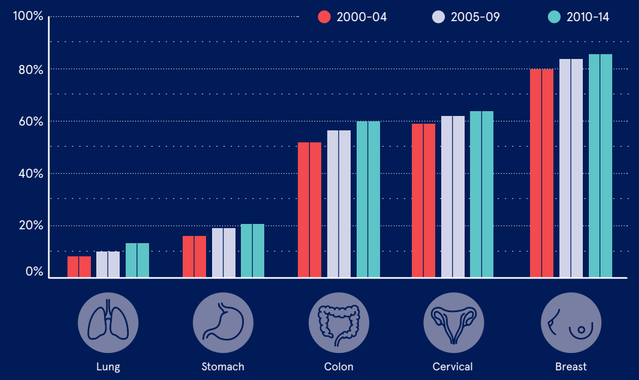
There are huge variations in 10-year survival rates among cancer types

Cancer Research UK, 2021

FIVE-YEAR CANCER SURVIVAL RATES ARE IMPROVING

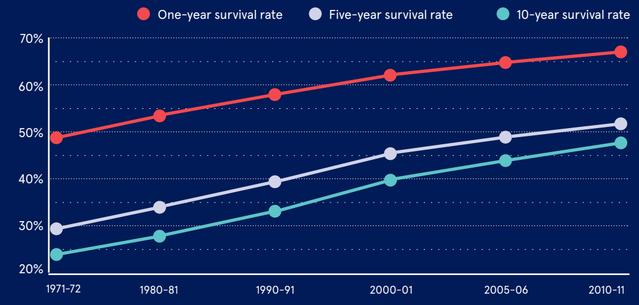
Organisation for Economic Co-operation and Development, 2021

Age-standardised survival among patients aged 15 and over in the UK



SURVIVAL RATES ACROSS ALL CANCERS HAVE INCREASED, WITH HALF OF PATIENTS PREDICTED TO SURVIVE THE DISEASE FOR AT LEAST 10 YEARS AFTER DIAGNOSIS

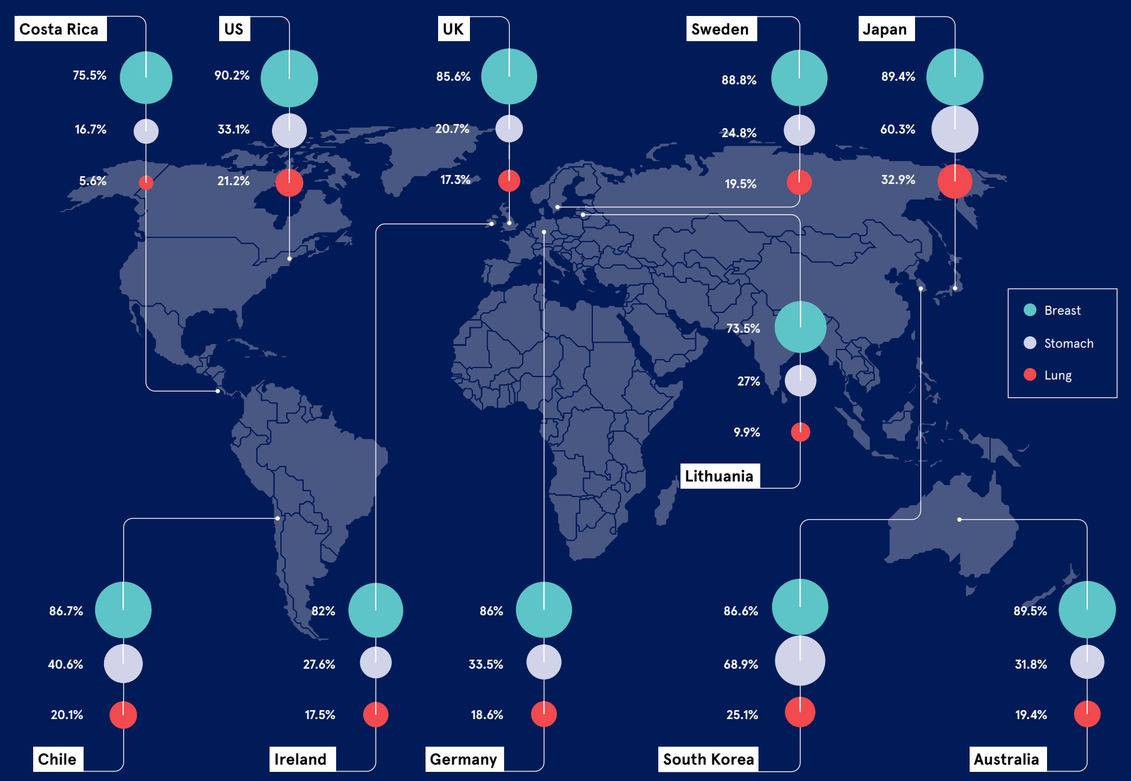
Net survival rates among adults across all cancers except non-melanoma skin cancer in England and Wales between 1971 and 2011



Cancer Research UK, 2021

THE UK LAGS OTHER COUNTRIES WHEN IT COMES TO SURVIVAL RATES FROM CERTAIN CANCERS

Five-year survival rates, 2010-14

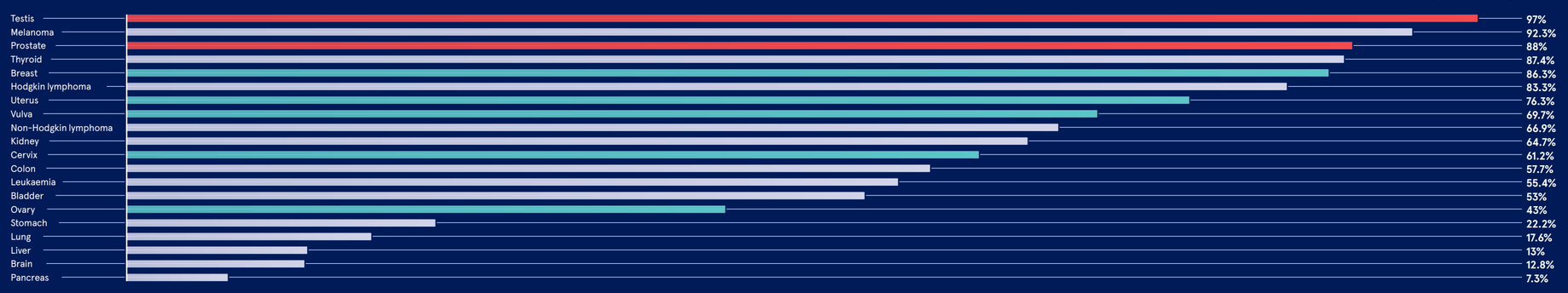


Organisation for Economic Co-operation and Development, 2021

FIVE-YEAR SURVIVAL RATES IN ENGLAND VARY GREATLY ACCORDING TO THE TYPE OF CANCER

Public Health England, 2020

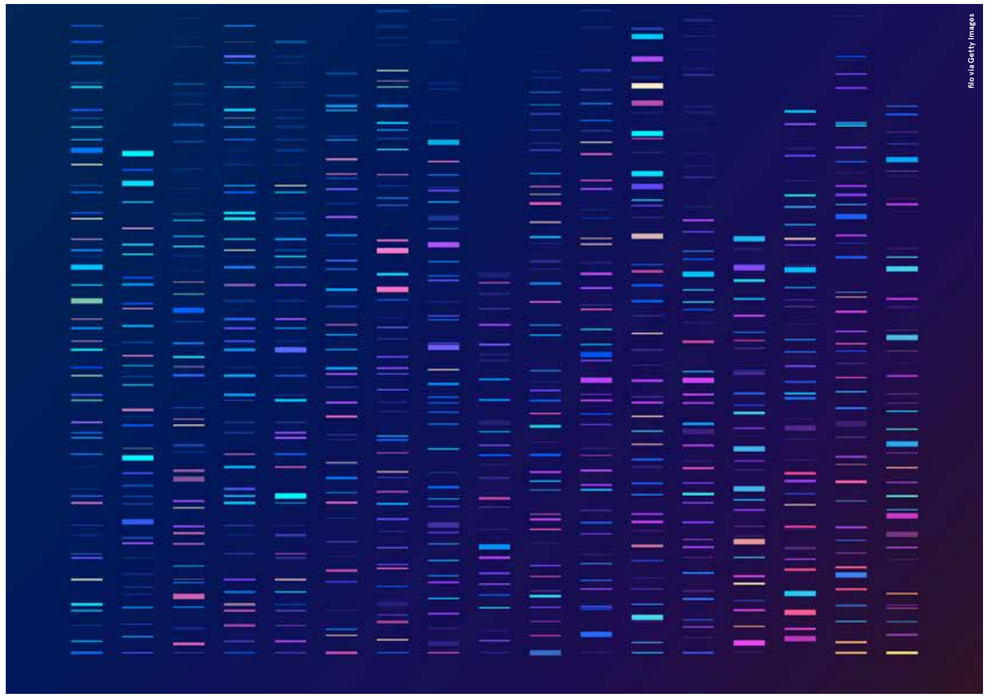
Five-year cancer survival estimates for people aged 15 to 99 years in England diagnosed between 2014 and 2018 and followed up to 2019



TREATMENT

This time it's personal: can genomics tip the balance in the war on cancer?

Genomic medicines could transform cancer treatment, saving millions of lives – all while cutting costs



John Illman

"What you now see is that every cancer is a rare cancer." So said Emile Voest, professor of medical oncology at the Netherlands Cancer Institute, in the journal *Nature* in March 2020. Voest was highlighting a revolution in cancer treatment that has been occurring over the past decade: the advance of genomics.

Genomics is the study of how genes interact with each other and their environment. This has had a massive impact in oncology. Voest went on to note that, as recently as 2010, lung cancer was "classified as either 'small cell' or 'non-small cell'. Today, it's described by the presence or absence of nearly 30 genomic mutations."

Identifying specific mutations in patients marks a radical shift away from a one-size-fits-all treatment and towards more personalised therapies. For instance, it could provide treatments for colorectal cancer with mutations in the so-called KRAS gene, which do not respond to some standard therapies. Likewise, acute myeloid leukaemia carries mutations that make it resistant to drugs known as isocitrate dehydrogenase inhibitors. Genomics could offer answers to this.

Cancer is far more complex than even the most visionary of scientists had ever imagined. Two decades ago, for example, researchers speculated that germ-cell testicular cancer might be attributable to a single gene. But a team led by Professor Clare Turnbull at the Institute of Cancer Research in London has since discovered more than 40 genomic variants associated with the disease.

Small wonder, then, that so many experts place such importance on genomics. And there has been significant progress. For instance, Turnbull led the 100,000 Genome Project, which sequenced 100,000 genomes from more than 80,000 NHS patients with cancer or a rare disease. This yielded potential research leads in nearly half of the patients taking part.

To appreciate why this is so remarkable, it is important to understand the context. The initial sequencing of the complete human genome took more than a decade to achieve at a cost of more than £2bn. Using a blood sample, a person's genome can now be sequenced in a day for less than £700.

Genomic medicine is already saving lives in a multitude of ways. Take DYPD, a gene mutation carried by 10% of the UK population that can make chemotherapy harmful to the bone marrow, potentially killing the patient. Advances in genomics mean that doctors can now test patients for the mutation at a cost of £50 each, saving lives and cutting costs for the NHS, notes Andrew Beggs, professor of cancer genetics and surgery at the University of Birmingham's Institute of Cancer and Genomics Sciences.

> **Oncology used to be like using sharp-pointed sticks and rocks. We now have more finesse and have moved to the equivalent of a scalpel**

But Beggs is concerned about a lack of public and even professional awareness about the scope for cancer prevention. For example, Lynch syndrome is a genetic condition that can increase the risk of bowel cancer by up to 80%. It also heightens the risk of other cancers. Beggs, who runs a Lynch syndrome clinic, says it's a relatively common condition, affecting about 1% of the UK population, but most people are not aware of it.

One reason for this is cultural. Most people think of the NHS as an institution they turn to when they are feeling sick, but genomic medicine points to a future when there will be a growing emphasis on prevention. Increasingly, families with a history of genetically linked cancers will be asked to undergo testing and any necessary treatment to stop the cancers developing at all. Yet Beggs says that some patients fear screening because they don't want to face up to the idea that they could be at risk from a fatal disease.

"Most people want to find out if they are at risk, but those people who don't want to know tend to be in their late teens and early 20s," he observes. "You can understand this. They are young and believe that it will never happen to them. But some are scared."

The answer, Beggs says, lies in the education of both healthcare professionals and patients. GPs have a critical role to play in identifying families at risk.

There are advantages to the NHS too. A single round of chemotherapy in a private hospital can cost up to £3,000, while cancer drugs cost the NHS more than £2bn every year. Although a single genomic treatment could cost up to £20,000, that is still cheaper than "putting a patient through hospital admissions with, say, five or six rounds of chemotherapy that don't work and that cause significant side effects", Beggs notes.

Statins, the widely prescribed drugs for lowering cholesterol, are another example of a cheap therapy that has been found to have a beneficial effect in genomic treatment. Costing as little as 4p per tablet, statins have been shown to reduce levels of a gene called P53. Mutations in P53 can cause cancer cells to grow and spread.

Statins are an example of repurposed drugs – old medicines used in new ways – that have long safety records. Their use can obviate the need for expensive new medicines. About 25,000 new substances are tested for every marketed medicine that makes enough money to pay for its development.

The arrival of genomic drug testing is also changing how clinical trials are designed. Traditional trials usually compare one drug with another, with patients divided into treatment groups. They remain on the trial from the start to the end – perhaps for several years – irrespective of whether it's helping them or not. The ongoing National Lung Matrix Trial could change this. Through this project – which is based on 11 treatment arms using different medicines – researchers at the University of Birmingham are matching various treatments to different groups of lung cancer patients according to genetic changes in their cancers. If a particular drug isn't working, that treatment arm is closed and a new one may be introduced. If a patient doesn't respond to drug A, they can be switched to drug B. They may be in and out of the trial within two months.

"In a traditional trial, the patients will receive broad-spectrum chemotherapies that do not work half the time," Beggs says. "Oncology used to be like using sharp-pointed sticks and rocks. We now have more finesse and have moved to the equivalent of a scalpel."

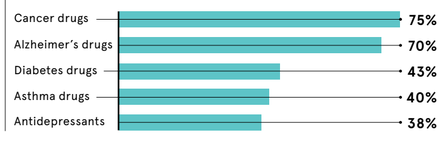
Thirteen regional genomic centres are now operating in England. One of their goals is to identify the patients who may benefit most from from genomic testing. Another is to ensure more effective use of medicines, not only in cancer but in all healthcare. The NHS medicines bill is about £17bn a year. But half of all medicines are not taken as prescribed and nearly 7% of hospital admissions occur because of adverse drug reactions, according to a recent report in *The Pharmaceutical Journal*.

What is also disturbing is that the effectiveness of drugs overall ranges between 30 to 50 per cent. Advances in cancer genomics are explaining why so much conventional chemotherapy fails: it does not target the correct mutations. Researchers hope that genomics will also lead to less harsh treatments – severe side effects arising from cancer therapy are all too common.

There is, of course, a long way to go before the genomic revolution reaches its full potential, but its success so far would have been unimaginable only a few years ago.

ONE SIZE DOES NOT FIT ALL, ESPECIALLY WHEN IT COMES TO CANCER TREATMENT

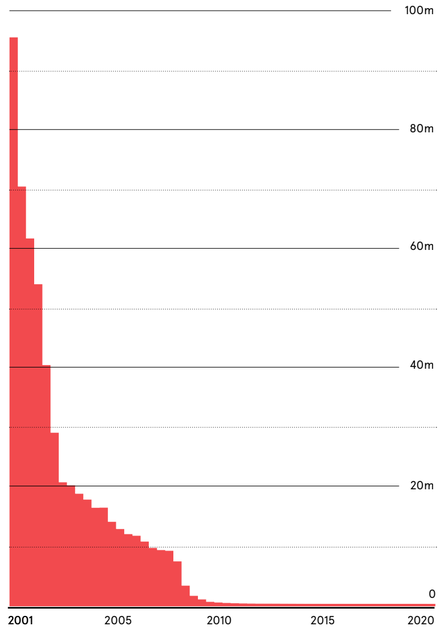
Percentages of the patient population for which a particular drug in a class is ineffective



National Human Genome Research Institute, 2021

THE COST OF GENE SEQUENCING HAS FALLEN DRAMATICALLY, MAKING IT MUCH MORE COST-EFFECTIVE TO USE IN CANCER SCREENING AND TREATMENT

Cost per genome ($)



National Human Genome Research Institute, 2021

Commercial feature

Making cancer treatment 'more human'

Leo Cancer Care's technology enables patients to stay upright during radiation therapy, improving the experience while reducing costs

An innovative UK company is transforming cancer treatment with an ingenious combination of advanced technology and the laws of nature.

Leo Cancer Care has re-engineered radiation therapy so that patients can be treated in an upright position where they are more comfortable, and gravity helps their bodies stay naturally still.

The development means that treatments can be delivered with alignment accuracy that is faster to achieve than when lying down, enabling clinicians to achieve high levels of success when removing tumours and for patients to have a better care experience.

Research has shown that lung movement is reduced by up to 5mm when a patient is upright compared to the supine position, which allows the radiation beam to be placed closer to the tumour without damaging healthy tissue.

The benefits radiate across the cancer care spectrum for patients, clinicians, hospital management and health systems that struggle to fund the high capital costs and running charges of traditional radiation therapy units, which have large rotating carbon ion beam gantries and can weigh up to 600 tonnes.

"By using a fixed beam and rotating the patient, rather than rotating heavy machinery around a patient, we aim to improve outcomes and take a lot of the stress out of the experience for patients," says Stephen Towe, chief executive at Leo Cancer Care.

"Our devices weigh around 100 kilos and can be set up in around a day and

> **Studies have shown there are clear, tangible benefits from being treated in the upright position and what really inspires all of us at Leo is that this makes effective cancer care more human**

half. With the help of the National Physical Laboratory, we are also developing a mobile solution so that treatments can be accessed in rural or isolated communities as well as cities.

"The impetus for this is that a lot of major cancer treatment centres identified that many patients could not tolerate being laid down and found it to be an uncomfortable, traumatic experience. One commented that it felt like being laid out in a morgue.

"Being upright is less stressful and there is a substantial reduction in lung motion because the body is not tense. We have created a better experience for the patient, an opportunity for them to really feel part of the treatment and be empowered by that. It is very rare that you can achieve all these three things at the same time, which is why this technology is so exciting."

Leo Cancer Care, which is based in Sussex, originated from a research group at Sydney University where Towe and a team of experts developed the principle into a suite of diagnostic and treatment devices that deliver significant outcome improvements and cost savings.

The company's Marie Particle Therapy Solution, named after Marie Curie, won a prestigious iF Design Award in April. It will be assessed for a CE mark later this year with the aim of having a prototype working in an NHS hospital within 12 to 18 months.

"A particle radiation therapy unit can cost around £250m and use around £3m a year in maintenance costs," adds Towe. "They often require a hospital to construct a new building to support the machinery and contain the radiation.

"Our devices can reduce operating costs by around 75% and are less than three metres tall so they can be installed in existing buildings - four of our devices will fit in the same space as just one traditional unit.

"Studies have shown there are clear, tangible benefits from being treated in the upright position and what really inspires us at Leo is that this makes effective cancer care more human."

The company is collaborating with several NHS hospitals and has been working closely with the University of Surrey and the Royal Surrey Hospital. Leo Cancer Care specialises in treating breast, lung, liver and prostate cancers, and is also working with partners to improve the paediatric cancer care experience.

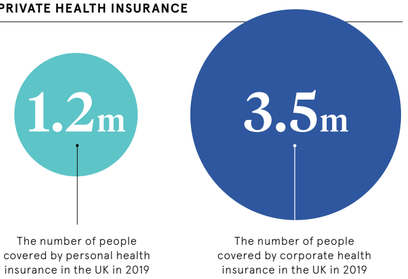
"The really exciting part is that we are making cost effective technology that has the ability to take care to places it's not been before so that more patients can get the treatments they need," says Towe.

For more information please visit www.leocancercare.com

LEO Cancer Care


Marko Geber via Getty Images

MILLIONS OF PEOPLE IN THE UK ARE COVERED BY PRIVATE HEALTH INSURANCE



The number of people covered by personal health insurance in the UK in 2019

The number of people covered by corporate health insurance in the UK in 2019

Association of British Insurers, 2020

ETHICS

Genomics poses data questions for the insurance industry

Predictive genome tests are a powerful early-warning tool for cancer. This could benefit insurers, but also raise issues concerning privacy

Danny Buckland

While genomic medicine has the potential to transform healthcare and save countless lives, it also has huge implications for another sector: insurance.

Health insurance has deep roots in the UK, reaching back to the 18th century. For many decades it was relatively straightforward. But the nuances of personal risk and the technological advances of the past 20 years have upended the industry.

Among all these achievements, one stands out: decoding the human genome. While insurance policies have been finessed over generations, genomic medicine and its ability to interrogate an individual's DNA for the merest hint of discrepancy has created new dynamics.

Take cancer screening, for instance. A range of companies are offering tests that reveal predispositions to anything from breast to colorectal cancer. For the price of a mini-break, you could discover the genomic undercurrents that may influence your future health and then act to mitigate the risks that have been revealed.

The prospect of such inexpensive, effective tests has broad appeal. For insurers, they help policy-holders to detect cancer at an earlier stage when treatment is less extensive and less expensive. For companies, it means that their employees potentially need less treatment and time off work, while pay-outs for death-in-service benefits are reduced.

Cancer screening in the NHS is under pressure, so anything that relieves the burden on a stressed system is welcome, particularly as most insurers are dealing with a rise in the number of critical-illness and income-protection claims as a result of the Covid crisis.

The Association of British Insurers (ABI) represents more than 200 companies, including those providing private medical insurance to 1.7 million people in the UK. It's in close contact with the Department of Health and Social Care on how its code on genetic testing and insurance will respond to a fast-changing situation. The open-ended code, under which insurers must neither put applicants under pressure to take predictive tests nor use their results, is reviewed every three years. But that approach might need to be replaced with a more fluid and regular assessment of the impact of genomic advances.

Most health insurance policies do not fund predictive tests and the industry believes that it can price risk from medical history and health questionnaires, according to Charlie Campbell, a manager in the ABI's health and protection team. It also has no interest in withdrawing from the code, no matter what predictive tests might emerge.

But such is the rapid improvement in testing's ability to detect cancer that the ABI's genetics working party has been given the task of "exploring sensitive touchpoints" to ensure that genomic capability is harnessed positively and does not unhinge access to health cover.

"If there is a need to change in future, we are in the position to talk with the government and manage that," Campbell says. "The purpose of the code is to offer assurance to customers that taking a test will not have an adverse effect on their ability to take out insurance."

That reassurance is needed. The government recently pulled back from a plan to collect and share personal health records for research amid public concerns about that data being made available to commercial interests

NHS cancer screening is a troubled sector. It's estimated that more than 2.5 million people missed their screening appointments during the UK's Covid lockdowns and 40,000 fewer cancers were detected than normal in those periods.

Professor Gordon Wishart is the founder, CEO and chief medical officer of Check4Cancer, a provider of private early detection tests. Noting that "there is a lot of friction in NHS screening and diagnostic pathways", he cites a 2019 report published by Cancer Research UK, which found that the UK had mediocre cancer survival rates even before the pandemic struck, partly because of inadequate early detection.

"We need to review our pathways and assess what additional screening we require on the NHS, because getting screening right is crucial to improving cancer survival rates in this country," he argues.

A former breast cancer surgeon, Wishart notes that early detection in some breast cancer patients can lead to 10-year survival rates greater than 90%, whereas the rate dips to about 30% for late presentations. He thinks that insurers and private screening providers can make testing more widely available, while also managing concerns about data privacy.

"If we provide cancer screening for a company, that information belongs to the individual, not the company, and that medical data is heavily protected," Wishart says. "We do a lot of work with a range of companies, educating them about cancer and then providing screening, because insurance companies are being asked by their clients to think about these things. This, I believe, will lead to a more integrated approach to screening."

More companies want to start or expand health screening to their employees to detect cancers earlier so action can be taken to improve or treat their health with better outcomes. The challenge is to balance the power of predictive testing with the data privacy.

There is time to work this out. While genomic medicine is advancing quickly, it's still far from the norm. Dr Doug Wright, medical director at Aviva UK Health, believes that polygenetic testing – trawling through a person's genome using a blood or saliva test to determine cancer risks – needs more evidence before it can enter the mainstream.

"I have no doubt that at some point the science will get there and we will have the ability to understand a person's particular propensity to different diseases," Wright says. "Although the testing robustness is not quite there yet, we need to have conversations about how the code should or shouldn't work."

There is also a need to ensure that not taking a test does not become a barrier to obtaining health cover, Wright stresses. "We ought to be having conversations with the government and striking the right balance, as you don't want to create a group of people that, in effect, becomes uninsurable," he says.

The safeguarding of test results is enshrined in the code. Experts believe that the growing power of testing will benefit business and the health system, which is coping with a 6.8% increase in the diagnosis of late and terminal-stage cancer.

"The impact of a cancer diagnosis in the workplace is wide-reaching, both on employers and employees: 53% of employees diagnosed with cancer face lowered income while 76% experience a negative impact on family life," Wishart says. "Evidence shows that a proactive approach to managing cancer in the workplace can lead to better treatment outcomes, improved survival rates and better employee wellbeing."

> **You don't want to create a group of people that, in effect, becomes uninsurable**

OPINION

'AI predictions may allow for treatments to be personalised based on a population that better represents the person sitting in the clinic room'

Artificial intelligence in radiotherapy is very much at a point of 'watch this space'. As public and private innovators develop and trial AI programmes, the technology has real potential to improve patient care by accelerating tumour mapping and using big data to help personalise treatments.

Radiotherapy planning requires clinicians to identify exactly where tumours are, while ensuring that they avoid healthy tissue. They do this by using CT imaging and manually contouring structures for each patient, which can take hours. But AI-based contouring programmes are now being developed and many cancer centres are already using them. At my centre, we use contouring AI for some critical structures, which are then validated and edited by clinicians.

This use of AI to speed up tumour mapping should mean that patients can start their radiotherapy more quickly, leading to better outcomes. In the future, AI in radiotherapy will enable oncologists to quickly adapt their plans in response to changes – for instance, a patient's weight gain – during treatment.

Meanwhile, cancer treatment generates a vast amount of data. If this can be linked to other routine health data from hospital and GP records, alongside social and demographic information, this would generate big data that could be used to improve clinicians' knowledge of the risks and benefits of treatment.

One of the challenges in oncology is that recommendations are based on the outcomes of clinical trials that are often highly selective and may not be representative of the patients we treat. For example, we know that older people are excluded and that certain ethnicities are underrepresented in some trials. AI predictions from big cancer data may allow for treatments to be personalised based on a population that better represents the person sitting in the clinic room. As we feed in more data, the system will learn and predictions may improve over time.

As with any prediction tool, AI will not be used in isolation. It will complement the clinical discussions between oncologists and patients. Better prediction tools could ensure that we aim certain treatments at patients who will benefit most from them, while avoiding giving others potentially toxic treatments.

But the implementation of AI in radiotherapy depends on the pace of validation and regulation. Clinical validation takes time – and cancer centres are working at full stretch, with capacity problems likely to worsen as we try to catch up with the backlog of cases that has built up during the pandemic. AI regulation is a complex area that's being led by NHSX, working with regulatory bodies such as the National Institute for Health and Care Excellence and the Medicines and Healthcare Products Regulatory Agency.

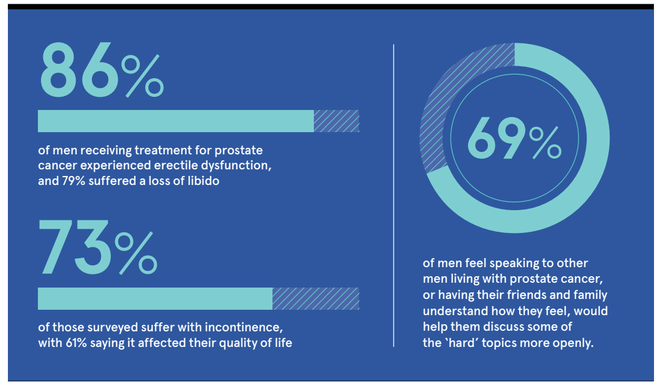
In terms of big data development, the challenge is huge when it comes to standardisation, anonymisation and collection. There are also concerns about data governance, confidentiality and clinical transparency.

While AI contouring programmes are not yet advanced enough for an NHS-wide roll-out, we are at an exciting development threshold. These programmes will become routine in the next five to 10 years. Big data in clinical oncology is at a stage where we can see how it may be useful, but significant challenges remain.

The Royal College of Radiologists' AI agenda group, alongside the wider clinical community, has a real opportunity to shape how AI is implemented. As someone who works in a smaller, non-academic cancer centre, I aim to ensure that these new technologies can be adopted across the whole country and aren't just limited to large centres serving urban populations.

Dr Delia Pudney
Consultant clinical oncologist, The Royal College of Radiologists' clinical oncology AI, machine learning and digi-tech agenda group

Commercial feature



Prostate cancer: time to talk about the side effects

While there are many treatments effective at controlling this cancer, there is a need to normalise conversations around side effects and navigating treatment

Prostate cancer is the most common cancer in the UK, with one man diagnosed every nine minutes. A range of treatments exist, including surgery to remove the tumour, radiotherapy or chemotherapy to destroy cancer cells, and hormone therapy that cuts off the supply of male hormones which feed the tumour.

However, while these treatments can be effective at controlling the cancer, they come with a range of side effects. As people live with cancer for longer, it's important that the research and medical focus is not limited to adding years to life, but also adding life to years so that people live well with and beyond cancer.

The charity Prostate Cancer Research (PCR), in partnership with Tackle Prostate Cancer and pharmaceutical company Ipsen, recently launched a nationwide survey to better understand the experiences faced by people living with prostate cancer. Their results, from a survey of more than 350 people across the UK, found that erectile dysfunction was the most common side effect, affecting 86% of men. Almost three quarters (73%) of those surveyed suffer with incontinence, with 61% saying it affects their quality of life. Other changes to the body can include weight gain and growth of breast tissue.

Mark, 57, is a retired policeman who was concerned his wife, Karen, thought he had "gone off her". The reality is this is another side effect of treatment - a loss of testosterone. The couple have shared a video in which they talk about the side effects Mark experienced from the chemotherapy and radiotherapy used to treat his cancer, which showcases how good communication can overcome some of the difficulties. "You don't lose it, the intimacy, in a loving way, and because of that you can get over the more physical aspect," says Karen. "The bigger picture is saving Mark's life."

Their video is part of the 'Let's Talk About The Hard Things' campaign, launched by PCR, Tackle Prostate Cancer and Ipsen, and backed by TV doctor, Dr Hilary Jones. The campaign was launched in response to the fact men feel uncomfortable talking about their side effects and mental health to the people they have the closest personal relationships with. Only 2% feel most comfortable discussing the topic with family and even fewer (1%) with friends.

PCR's key focus is to fund the research that will lead to better treatments, which will prolong life without the side effects. Among their 10 ongoing projects and five new research projects announced today (30 June), they back a new type of radiotherapy that could hunt out prostate cancer cells in a more targeted way, hopefully reducing the number of healthy cells which are damaged and therefore reducing side effects, at Oxford. A potential new drug target which would again be more specific to prostate cancer cells is under investigation in Glasgow, and separate research efforts are underway in universities in London, Norwich and Cambridge to determine who should receive specific treatments and who could be spared their side effects.

But while these research efforts are coming to fruition, it is important that we normalise conversations so that every individual affected by prostate cancer can feel supported as they navigate their treatment and beyond. Visit www.pcr.org.uk/hard-things to watch a diverse range of people sharing their own experiences, and to find out where you can seek support.

For more information please visit www.pcr.org.uk/hard-things

Prostate Cancer Research

> **Unfortunately many men of my generation were taught from a young age to 'figure it out' and 'emotions are for girls'. But talking to your partner, your family and your friends can make the world of a difference. I urge anyone undergoing treatment, no matter how embarrassing you might feel it is, don't suffer in silence. Find someone you can trust and speak with them. You won't regret it.**
>
> **Brian**
> Prostate cancer patient

TECHNOLOGY

Cancer care in the age of telemedicine

Thanks to Covid-19, doctors are doing much of their work online or over the phone. But is this suitable for cancer care?

Chris Stokel-Walker

"You have cancer." These are the words that no one ever wants to hear. But, thanks to the pandemic, many people over the past 16 months have received this shattering news via a phone or video call.

Before Covid-19 struck the UK, only 10% of healthcare providers saw their patients using telemedicine methods, according to Ipsos Mori. Now it's about 70% in some areas of provision.

The widespread adoption of telemedicine, combined with the NHS's need to tackle the unprecedented backlog of cases – mean that more of us are likely to be told of, and treated for, cancer through a phone or laptop screen in the future.

"We've all had the training mantra from medical school of: 'You hold those difficult conversations in person to be able to read the patient's body language and make sure that things are OK,'" says Richard Roope, a GP and primary care adviser at Cancer Research UK. But the constraints that the Covid crisis has placed on the NHS mean that face-to-face conversations haven't always been possible.

"Covid has taught all of us GPs a new skill, which is to give bad news over the phone, because sometimes there hasn't been another option," Roope says.

While the supportive hand on the shoulder will never go amiss, some patients, particularly those who have already received the bad news and started their treatments, have found the lack of face-to-face contact a boon.

"We were really concerned that it would have a really bad impact on patients and families," says Robin Jones, a consultant medical oncologist at the Royal Marsden NHS Foundation Trust in London. "But I think, on a positive note, that it has really helped some people."

After the pandemic struck in March 2020, three-quarters of Jones's scheduled face-to-face appointments at the Royal Marsden Hospital's sarcoma unit became virtual. Those that remained in person involved the most pressing cases.

Jones ended up surveying his patients about his adoption of telemedicine. Perhaps surprisingly, he found that they enjoyed the experience, ranking telemedicine consultations at nine on a 10-point scale. Previously, the average patient at the hospital would travel for 90 minutes to fulfil their appointment, which perhaps explained their enthusiasm to see a specialist from the comfort of their own homes.

With public transport still a risky proposition for many, particularly those undergoing treatment who may be immunocompromised, and taxis or car parking charges quickly racking up, the convenience of a quick Zoom call can outweigh the impersonal touch.

Alongside the convenience factor, the location in which you're told the bad news could make telemedicine a preferred solution for cancer treatment in the future. Hospitals, ironically, can often be inhospitable places. Many people have well-founded fears of finding themselves within their walls.

Roope can understand how a safe, comforting and known environment could prove to be something of a balm during traumatic times. It can also enable members of the family support unit that will help a cancer patient through their treatment – and the inevitable highs and lows – to be closer when there is bad news.

"A lot of people found the option of being at home, with several members of their family, a better way," Jones reports. "Some patients found it a really useful change."

Ipsos Mori found that 75% of doctors intend to continue with virtual consultations, including for cancer treatment, once the pandemic is over. While it's not for everyone, "having the option of telemedicine consultations is really good for some people", Jones says.

For cancer patients who are deep into their treatment and undergoing routine appointments, the convenience of telemedicine can hold some appeal. But at key points it's still important for patients to be able to look into the eyes of those breaking bad news.

"If we look at the whole patient pathway, we have seen the rise in telephone triage in primary care," Roope says. "That has forced us to think about pathways and whether what we've done is the best way to go about things."

He cautions that telemedicine doesn't always pick up some of the most urgent cases because doctors are likely to miss important contextual information when they lose the face-to-face element. A patient can exhibit telltale signs of concern in a clinic or a GP's surgery that could trigger an urgent referral – something that might more easily be hidden by the controlled gaze of a Zoom call, say.

"Very often you can pick up that something's awry from the patient's demeanour because you know them," says Roope, who adds that it's the gestalt – the overall view of a patient – that is often key.

Yet, despite its shortcomings, there are plenty of benefits to be had from the telehealth revolution. Jones is further investigating how telemedicine can be used and when it's most relevant for patients.

"Someone who's had many treatments with us and knows us really well is probably more prepared to have a telephone, rather than a face-to-face consultation," he says.

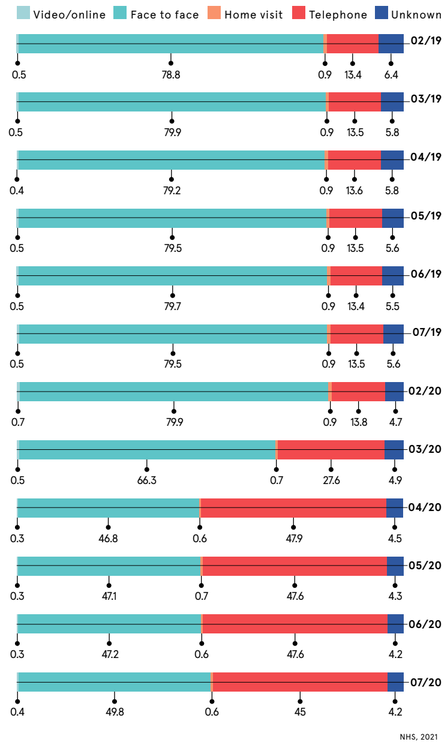
Doctors will have to learn new skills, such as triaging and picking up problems through digital and phone contact with patients. Most crucially of all, they'll have to decide when to direct patients to physical meetings.

"That will be a new skill," Roope says: it's knowing "when to bring patients in".

> **Covid has taught all of us GPs a new skill, which is to give bad news over the phone, because sometimes there hasn't been another option**

THE NUMBER OF TELEPHONE APPOINTMENTS WITH GPS, INCLUDING FOR CANCER CARE, SOARED DURING 2020

Percentage of appointments by source, monthly

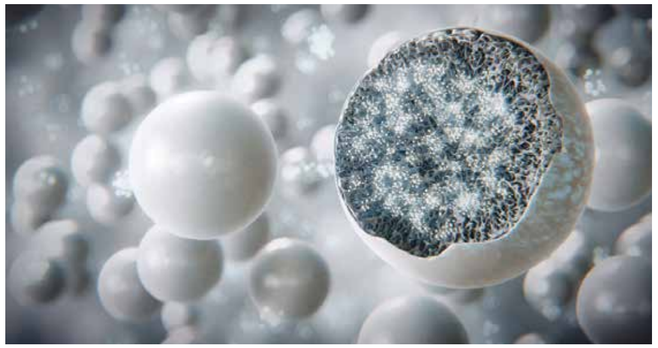


NHS, 2021

Commercial feature

Targeting Technology offers hope for cancer patients

Cancer treatment has come a long way, but there are still challenges in delivering life-saving drugs to patients without compromising their health in other ways. Innovative breakthroughs in pharmaceutical technology, however, could be changing the game



Since the first cancer therapies evolved from World War I mustard gas in the 1940s, scientists have brought us increasingly effective (and expensive) cancer drugs, culminating in latest generation blockbusters like Keytruda, Opdivo and Avastin. Most chemotherapy drugs are, however, dose limited, because they are also toxic to healthy cells and organs.

An innovative UK biotech has devised novel techniques to take drugs directly to the tumour where they are needed. Higher doses of drug can be delivered over a controlled period, resulting in more of the drug in the tumour and less of the drug circulating in the body.

Midatech Pharma – a fusion of science, engineering and pharmaceutical development – has created a suite of breakthrough technologies that provide precision targeting of medicines to the tumour site. Its unique drug delivery platforms are also energising prospects for rare brain cancers that are traditionally hard to treat because most drugs will not cross the protective blood-brain barrier.

Midatech Pharma's Q-Sphera microtechnology encapsulates medicine in biodegradable polymer microspheres that can be injected to a specific site in the tumour and programmed to release their payload over time to destroy a cancer from within.

Its Midasolve technology makes inherently insoluble drugs soluble so they can be administered in liquid form directly into tumours via a pump and catheter system. Around 12,000 new brain cancers are diagnosed every year in the UK, according to Cancer Research UK, but treating them presents huge problems, with drugs unable to pass through the blood-brain barrier and reach their target.

Midatech Pharma is deploying its Midasolve technology to advance clinical trials of MTX110, a novel formulation of the drug panobinostat, which is normally administered as an oral tablet for multiple myeloma. "It is not useful in oral form for treating brain cancers because not enough of the drug can get to the brain, but Midasolve makes that possible," said Stephen Stamp, CEO of Cardiff-based Midatech Pharma that was established in 2000 and was publicly listed on AIM in 2014 and on NASDAQ in 2015. "It is an ineffective drug with a maximum dose of 20mg when given orally, but we can deliver concentrations tens of thousands times higher, directly into the tumour, while also minimising its exposure to healthy tissue, providing hope of improved outcomes for patients with rare brain cancers such as Diffuse Intrinsic Pons Glioma and Glioblastoma Multiforme".

The Q-Sphera and MidaSolve platforms provide clinicians with new, effective ways to treat cancer – including the ability to tackle brain cancers as they circumvent the blood-brain barrier – and activate the potential of a range of drugs to be considered for oncology.

"Our technologies improve the biodelivery and biodistribution of medicines and open up great opportunities for healthcare systems, drug developers and patients," added Stamp. "The benefits for the patients are fewer hospital visits, fewer side effects and potentially greater efficacy with higher doses. People don't just want to live for treatment; they want to live while having treatment and our technologies help them do that by reducing those side effects that have adverse impact on quality of life."

Many of the latest generation cancer drugs are biologics or monoclonal antibodies. Midatech Pharma recently scored a major breakthrough by devising a process to encapsulate a monoclonal antibody (mAb) in its Q-Sphera technology, so that these powerful biologic products can be delivered as long-acting injectable formulations, providing benefits for patients, physicians and payors. Global sales of mAbs amounted to $154bn in 2020.

"Our proprietary technologies can result in significant savings for healthcare systems, provide clinicians with access to an arsenal of drugs to treat cancer and give patients, particularly in rare brain cancers, improved treatment options and better quality of life," added Stamp.

12,000

is the approximate number of new brain cancers diagnosed every year in the UK

Cancer Research UK

For more information please visit midatechpharma.com

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