

Key Points

- Aspiring to achieve world class cancer outcomes in England is vital for the one in two of us who will be diagnosed with cancer in our lifetime.¹
 - Decades of breakthroughs in cancer research and efforts to improve cancer services have seen cancer survival double in the UK over the last 40 years. But even with these improvements, **cancer survival still lags behind many comparable countries**, despite several welcome Government commitments to accelerate progress and improve cancer outcomes.²
 - **The COVID-19 pandemic has seen over 36,000 fewer patients begin cancer treatment in England compared to pre-pandemic.** The pandemic's impact will likely be felt for years to come and set back efforts to increase early diagnosis and improve cancer outcomes.
 - **However, cancer services were already significantly struggling before the pandemic**, with cancer waiting time targets routinely missed by significant margins for years. The 62-day target for patients to begin treatment following an urgent GP cancer referral has not been met since December 2015.³
 - **The challenge of improving cancer outcomes is only set to grow.** Rising cancer incidence due to a growing and aging population means that the number of people diagnosed with cancer each year in the UK is projected to grow from 367,000 in 2017 to over 500,000 by 2035.^{4,5}
 - **England, already lagging behind comparable countries, now faces the risk of cancer survival going back for the first time in decades.** With cancer outcomes already not good enough pre-pandemic, we must go further and look to build back better for every cancer patient, now and into the future.
 - To put England among the very best countries in the world by 2030, Cancer Research UK estimates that **we must double the rate of improvement in cancer survival.**
 - The contributing factors that affect cancer outcomes are complex, and to improve cancer survival will require efforts on all fronts – particularly in the case of reducing the late stage diagnosis of cancer and seeing more patients diagnosed earlier in their disease course, with stage at diagnosis one of the most important factors in determining cancer outcomes.
 - We support the ambition to diagnose 75% of cancers at an early stage set out in the NHS Long Term Plan for Cancer (LTP). Achieving this will help improve outcomes for cancer patients and close the gap with the best comparable countries. **However, we are well off track to reach this ambition, and Cancer Research UK analysis of the measures set out for cancer in the LTP show that we will need to go further and faster if we are to achieve the 75% early diagnosis ambition.**
 - **We must harness the spirit of innovation seen through the pandemic** by delivering transformational interventions like the Community Diagnostic Hub model set out in the
-

Richards review of diagnostic services,⁶ as well as supporting research and innovation into the interventions of the future that will improve cancer early detection, diagnosis and treatment.

- **Expanding capacity in cancer services, by training the workforce of the future and investing in diagnostic equipment, is vital to enabling diagnostic reforms, improving cancer services and putting cancer outcomes in England among the best in the world.** Years of under-investment in workforce education and training, and insufficient capital settlements for key diagnostic equipment, have meant that patient need is outstripping capacity in cancer services, and service transformation and efforts to integrate innovative interventions and approaches is hampered.
- **Government must invest to enable a transformational recovery in cancer services at the upcoming 2021 Comprehensive Spending Review.** Without Government leadership on cancer – underpinned by urgently needed investment – not only will Government fail to deliver it’s 2019 Manifesto commitment to increase cancer survival rates, but efforts to reduce waits for cancer diagnosis and treatment will be hindered and the ambitions of the NHS LTP will remain out of reach. Inaction will mean we will miss this vital opportunity to build the world leading cancer services that patients deserve and risk entering the next General Election facing the prospect of cancer survival going backwards in this country.

Recommendations

- We estimate that the Government must invest **around an extra £200m in Health Education England (HEE) for cancer in the 2021 Comprehensive Spending Review** to meet the 2017 Cancer Workforce Plan target for 45% growth in the cancer workforce by 2029.
 - Government must **ensure that funding is provided to expand diagnostic capacity and fully implement the recommendations of the 2020 Richards review of diagnostic services in the 2021 Comprehensive Spending Review**, including:
 - **Implementing the Community Diagnostic Hub model** in the 150 sites committed to across England in coming years.
 - **Invest the £1.3 billion in capital funding required to bring CT, MRI and PET-CT equipment capacity to the average across comparable OECD countries.**
 - **Provide the NHS with the capital investment to expand endoscopy capacity** by the estimated 200 extra endoscopy suites needed to meet patient demand, both across current diagnostic services and within Community Diagnostic Hubs.
 - Government must invest to support the timely **implementation of proposed reforms to national cancer screening programmes** set out in the 2019 Richards screening review.
-

1. Why do cancer outcomes in England – in particular survival – still lag behind comparable countries internationally?

England's cancer outcomes still lag behind comparable countries internationally, despite improvements

In recent decades, thanks to advances in life-saving cancer research and efforts to improve cancer services, cancer outcomes have improved significantly. In the 1970s, one in four cancer patients in the UK survived their disease for 10 years or more – today, two in four people do.⁷

Despite these significant and laudable improvements, the UK still lags behind comparable countries internationally with similar healthcare systems, levels of wealth and comparable data.⁹ As long ago as the NHS Cancer Plan in 2000, the gap between cancer survival in England and comparable countries was recognised – as was an ambition to close the gap.⁸ However, while successive national plans committed to improve cancer outcomes as most recently set out in the NHS Long Term Plan (LTP), comparable countries across the world continue to see better outcomes and a faster pace of improvement across a range of cancer outcomes including survival.

This is starkly illustrated by research from the International Cancer Benchmarking Partnership (ICBP), a coalition of countries including the 4 UK nations, Ireland, Canada, New Zealand, Australia, Denmark and Norway. The ICBP's Cancer Survival in High-Income Countries Phase 2 (SURVMARK-2) study found that there many areas where the UK significantly lags comparable countries on 5-year cancer survival for the most recent period for which we have data (2010-2014):

- **Lung cancer:** 5-year survival in England was 15.0%, which is where Australia was 10 years prior (14.9%) – Australia continues to push ahead, with 5-year survival at 21.4% in the most recent period.
- **Colon cancer:** 5-year survival in England was 58.9%, which is approximately where Australia was 15 years ago (59.6%, 1995-99), Australia has reached 70.8% in the most recent period.
- **Rectal cancer:** 5-year survival in England was 62.2%, approximately 10 years behind Canada who reached 61.6% 5-year survival in 2000-04; they were at 67.0% in the most recent data.
- **Oesophageal cancer:** 5-year survival in England was 16.5% in the most recent period, compared to 23.5% in Australia. In 1995-99 Australia was still ahead with a 18.3% 5-year survival.
- **Pancreas cancer:** 5-year survival in England was 8.1% in 2010-2014 which is approximately where Australia and Canada were 10 years ago (7.8%, 2000-2004), they are now at 14.6% and 11.1% respectively in the most recent period for which we have data.
- **Stomach cancer:** 5-year survival in England was 21.2% in 2010-2014 which is approximately where Canada were 15 years ago (21.5%, 2000-14), they are now 29.8% (2010-14).

ICBP data also shows that in England is also poorer at diagnosing cancers at an early, more treatable stage than the best performing countries, with later stage diagnosis contributing to worse cancer survival in England. Recent international stage data on colorectal, lung and ovarian cancers shows that, though England does not have the worst stage distribution – we are diagnosing more cancers

^a There are significant, complex challenges to making international comparisons on cancer survival. Often data availability is poor or is not directly comparable. Given the time taken to measure survival (with key metrics being 1-year, 5-year and 10-year survival) meaning there is a significant lag that can mean the most recently available, internationally comparable data may refer to patients diagnosed many years prior to publication. However, this does not hinder the value of this data, particularly where it is possible to examine trends over time.

at an early stage, and fewer at a late stage than some other countries – overall **patients in the England were diagnosed at a later stage than comparable countries with the best cancer survival outcomes**, notably Australia.^{9,b}

Evidence also indicates that England is poorer at providing the best cancer treatment to patients. Survival by stage data is a crucial indicator for assessing quality of cancer treatment and care, with **patients in England broadly having poorer comparable survival outcomes across every stage of diagnosis**. This is particularly the case for cancer patients diagnosed with advanced disease and for older cancer patients, and with over one in three cancers diagnosed in patients over the age of 75, poorer outcomes for these patients significantly contribute to the gap in outcomes between England and the best comparable countries.

Achieving the best cancer survival outcomes in the world requires a significant increase in the current rate of improvement. We estimate that, **to ensure that the UK has one-year cancer survival outcomes among the best performing comparable countries by 2030, we have to double the rate of improvement**. Improving one-year survival will contribute to improvements in five-year cancer survival, and drive forward efforts to ensure that cancer patients in England have the very best chances of surviving their cancer.

Workforce shortages and a lack of key diagnostic equipment are a key barrier to closing the gap between England and the best comparable countries

There are a range of factors identified by the ICBP that may have contributed to the gap between cancer outcomes in England and the best performing comparable countries, including differences in population attitudes and beliefs about cancer, timeliness of referral and management across primary and secondary care, health system differences and access to treatment, among others.¹⁰ However, one of the most significant barriers to England closing the gap is **a lack of capacity in cancer services due to workforce shortages and a lack of key diagnostic equipment and facilities**.

In recent years, the growth in the NHS workforce has failed to keep up with patient need. 1 in 10 of all posts across the NHS in England were vacant in 2018/19 and it was estimated that, with no action taken, this would rise to 1 in 7 posts vacant by 2023/24.¹¹ According to the BMA, when comparing England to other EU nations within the OECD, which have an average of 3.7 doctors per 1,000 people, the medical workforce in England is short of around 49,000 doctors. This means each doctor in England is doing the equivalent of 1.3 FTE roles. They found that on the current trajectory of workforce growth, the NHS would not match the OECD EU average until 2046.¹² Not only does this impact on the care of every NHS patient, but given the complexity of cancer care, systemic issues with workforce shortages even beyond specific cancer specialties impact on cancer care.

The problem is acute among specialties key to the diagnosis and treatment of cancer. The consultant radiology workforce across the UK is now short-staffed by 33% and needs almost 2,000 more consultants to meet safe staffing levels and pre-coronavirus levels of demand for scans. Without more training, investment in new models of care and better retention and recruitment, by 2025 the radiologist shortfall will hit 44%.¹³ The 2020 RCR clinical oncology census found that the consultant clinical oncology workforce has a shortfall of 17% which could rise up to 29% by 2025. This has risen

^b International stage data on stomach, pancreatic and oesophageal cancers will be published in due course

from 10% in 2015. It also found that vacancies were increasingly difficult to fill, with 55% of posts being open for over a year, compared to 29% in 2015.¹⁴

The impact of staff shortages is already being felt. The RCR 2020 Clinical Oncology census found that over half (52%) of cancer service leaders though workforce shortages have negatively impacted the quality of patient care.¹⁵ More than half (58%) of radiology leaders say they do not have enough radiologists to keep patients safe.¹⁶ While cancer patients have borne the cost of workforce shortages, this also impacts NHS financial sustainability. Across the UK, £128 million was spent on outsourcing the reporting of scans to the independent sector – equivalent to the combined salaries of a third of the current consultant radiologist workforce. This has risen over 58% since 2018.¹⁷

Looking forward, Government must provide strategic, sufficient long-term investment in workforce education and training, and for procuring key diagnostic equipment at the upcoming Comprehensive Spending Review. Expanding capacity in the NHS, through investment in training key cancer professions, is vital not only to ensuring timely patient care but also allowing the NHS time and space to innovate, all of which is vital to catching up with the very best countries in the world on cancer outcomes.

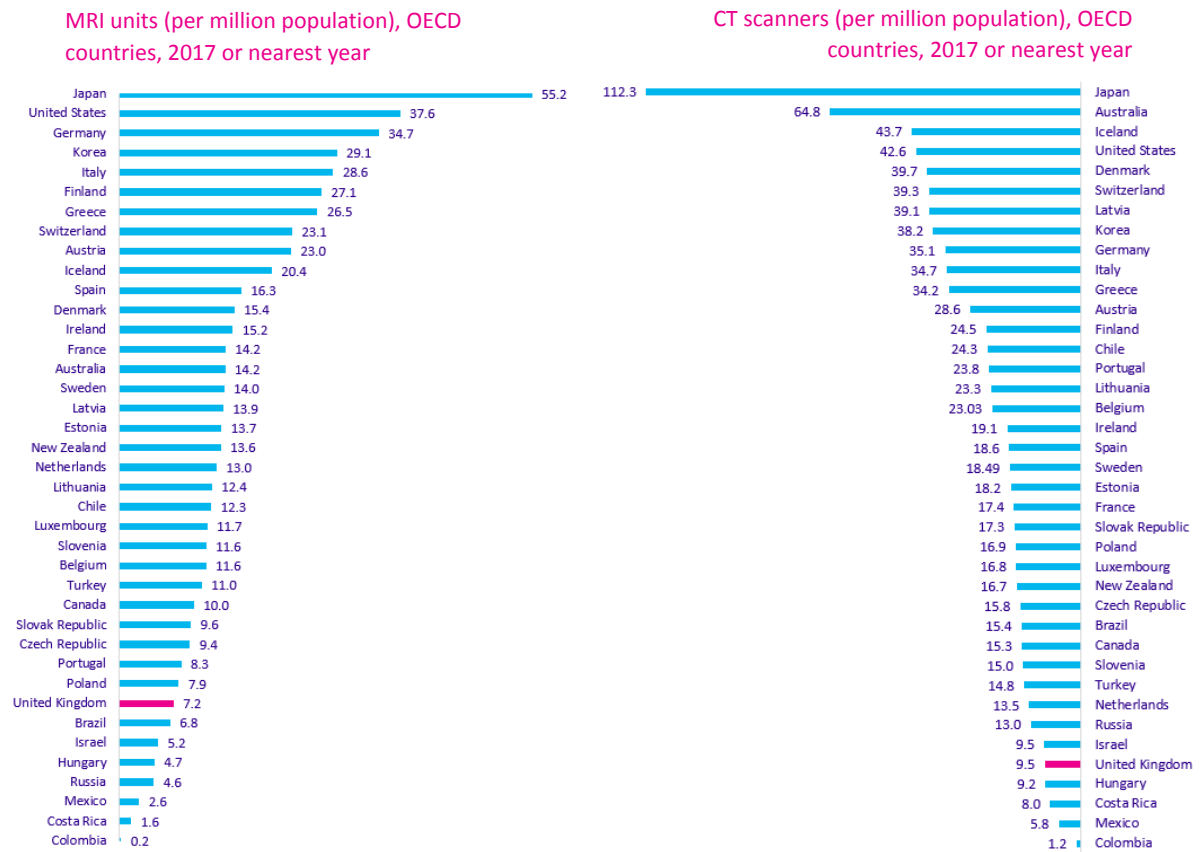
Health Education England (HEE) previously estimated that the NHS will require an aggregate growth of 45% in its cancer workforce to deliver world-class cancer services by 2029. Last year CRUK estimated that to achieve this level of growth across seven key cancer professions, an additional investment of between £142 million and £260 million would be required in staff training and education in the following 3-5 years.¹⁸ Some welcome investment was made in the 2020 Spending Review, with £46 million committed to diagnostics and cancer workforce, supporting 245 new training posts in key professions. However, to ensure progress towards the growth needed in the cancer workforce is maintained, we anticipate **Government must invest around £200 million for cancer in HEE at the 2021 Comprehensive Spending Review.**

Given growing cancer incidence and the impact of the COVID-19 pandemic on cancer services and the cancer workforce, it will be important that projections of demand on cancer services and anticipated workforce supply continue, and that investment in workforce education and training keeps pace with patient need. Cancer Research UK is currently updating its estimate of what is needed for the cancer workforce, and will share this with the Committee in due course.

The last decade has also been marked by underinvestment and a lack of strategic planning for equipment and infrastructure critical to cancer services. Though there were positive commitments for investment in diagnostic services in the 2020 Spending Review, successive spending reviews and budgets have failed to provide sufficient, long-term investment – instead plugging gaps while failing to tackle fundamental issues in ensuring timely diagnosis.

Internationally, the UK compares poorly, ranking close to the bottom on average number of MRI and CT scanners per million among OECD countries.¹⁹ For example, PET-CT is an advanced technology which allows for more accurate diagnosis and staging. However, England has the third lowest number of the ICBP countries and has also been slow to acquire them.²⁰ We are also overly reliant on ageing scanners, which are less sophisticated and prone to breakdown. There is evidence of outdated equipment frequently disrupting care, with clinical staff concerned ageing diagnostic equipment has negatively impacted their work.²¹

Not only does a lack of investment in diagnostic equipment hinder timely diagnosis, but it also hinders efforts to drive service improvement. For example, upgrading and increasing scanning capacity would enable more innovative approaches to diagnosis, but the age of many MRI scanners means they are less likely to be capable of multiparametric MRI (mpMRI) scanning, meaning the 2018 NICE recommendation that such scanning is the first choice for diagnosing prostate cancer cannot be fully implemented.²²



Source: OECD, "Health at a Glance 2019: OECD Indicators," OECD Publishing, Paris, 2019.

The 2020 review of diagnostic services led by Professor Sir Mike Richards called for a substantial, urgent, expansion of diagnostic capacity, and proposed significant reforms that could transform diagnostic services in England.²³ **In the 2021 Comprehensive Spending Review, Government must ensure that sufficient funding is provided to expand diagnostic capacity and fully implement the recommendations of the 2020 Richards review of diagnostic services.**

A central recommendation in the Richards review was to establish community diagnostic hubs (CDHs). This innovative model would see a broad range of key elective diagnostic procedures, for cancer as well as other conditions, brought together in a 'one stop shop' model. The CDH model has the potential to improve patient access by bringing diagnostic services into one location and closer to patients, could increase efficiency in diagnostic services and play an important role in supporting Rapid Diagnostic Centre model set out in the NHS LTP.²⁴ NHS England intends to establish 150 CDHs, **and the 2021 Comprehensive Spending Review must deliver the capital investment needed to fully implement the CDH model across England.**

Implementing the CDH model could play an important role in delivering the urgently needed expansion in diagnostic capacity, as well as supporting current diagnostic services. Just to close the gap with comparable OECD countries, **the UK Government must invest £1.3 billion required in CT, MRI and PET-CT equipment.**²⁵ The Richards diagnostic review also estimates that **200 new endoscopy rooms are required to meet patient need**, which must also be a priority for investment in diagnostic services.

The 2019 review of adult screening services led by Professor Sir Mike Richards set out a programme of transformation in cancer screening, through increasing informed uptake, considering risk stratified screening and exploring where new technologies such as artificial intelligence could expand capacity. However, the review also identified significant challenges, including workforce barriers and outdated equipment which significantly limit efforts to optimise and transform cancer screening. For example, constraints on capital funding stopped trusts from replacing equipment such as mammography machines and mobile vans used for screening, meaning in some cases, mobile vans over 17 years old with leaking roofs were still in operation, demonstrating the clear need for investment to replace current stock.²⁶ **Government must respond to the Richards screening review, and set out a clear plan, with sufficient funding, to deliver on the recommendations.**

Thinking towards the future it is also important to consider that, while the most acute pressures at present are in diagnostic services, if we are successful in reducing late stage cancer diagnosis this will mean more patients are able to have potentially curative treatment such as surgery and radiotherapy – meaning capacity will also need to grow in treatment services. Moreover, many of the most innovative treatments that are currently emerging, including targeted therapies and immunotherapies, will in coming years require the NHS to plan for sufficient capacity to expand genomic testing and skills to deliver these new treatments.

2. How will COVID-19 affect efforts to catch up to the best cancer outcomes internationally?

It is challenging to assess how COVID-19 will affect efforts to catch-up given the complex landscape, with countries faring better or worse at any one time dependant on the level of COVID-19 infections. There have been efforts to assess the impact on cancer services internationally,²⁷ but the picture is still emerging. The ICBP is currently exploring how to measure the impact of COVID-19 on cancer services and cancer outcomes across the 7 countries it studies, initially surveying ICBP countries in December 2020 – February 2021 to capture a broad overview of the impacts of COVID-19.

Cancer screening programmes are an easier aspect of cancer control to assess for COVID impact. Whilst there are no tangible results yet, **we do know that screening services in other countries have fared better than the UK** in some respects – for example **Australia was largely able to continue most cancer screening programmes (Jan-Sept 2020)**²⁸, **while the UK saw 3 million fewer people invited for screened for cancer between March and September 2020** due to the initial pausing of cancer screening at the start of the pandemic.

We also know that cancer services in **the UK entered the pandemic in a less resilient position than many comparable countries because of chronic shortages in healthcare staff and equipment**, as was explored in the previous section.

It is clear that the COVID-19 pandemic has had a devastating impact on cancer services. In the first wave of the pandemic, cancer services across the pathway faced significant disruption as a result of the unprecedented pressure COVID-19 placed on the NHS and urgent efforts were made to protect cancer patients undergoing treatment from this virus.

In the year from the start of the pandemic^c, **over 36,000 fewer patients started cancer treatment in England compared to pre-pandemic.**²⁹ Many factors have contributed to this, with fewer patients beginning treatment following a positive screening test, and many patients facing delays across cancer services. Disruption to services has meant there are people living unaware they have cancer who would otherwise have been diagnosed, with the risk that their disease may progress, making it much harder to treat and worsening survival chances. It is also possible that some of those who would have been diagnosed with cancer and begun treatment had it not been for Covid-19, have died from other causes.

Across cancer services in England:

- With screening programmes across the UK initially paused, **we estimate 3 million fewer people had cancer screening between March – September 2020.**³⁰ In England, this meant 42% fewer people began treatment following a positive cancer screening test between March 2020 and March 2021 compared with pre-pandemic.
- **We estimate more than 326,000 fewer people were urgently referred** for suspected cancer in England between March 2020 and March 2021 compared with pre-pandemic
- For 7 key diagnostic tests used to diagnose cancer, **there were 4.6 million fewer tests carried out** between March 2020 – March 2021 in England compared to pre-pandemic – a fall of 22%.³¹

This impact on cancer services has had a heart-breaking impact on cancer patients and their loved ones. Cancer Research UK's most recent survey of cancer patients has found that **a third of cancer patients reported receiving worse care since the pandemic began**, with a similar proportion experiencing delays, cancellations or changes to their treatment.³² This led to a significant impact on patients' experience during an already highly challenging period of undergoing cancer care - around two-thirds of cancer patients reported feeling more 'frustrated' (67%) and more 'anxious' (62%) since the pandemic began, and 64% of patients facing undergoing treatment on their own.³³

The most recent available data indicates that the numbers of patients entering cancer services and beginning treatment each month are broadly similar to, or in places exceeding, pre-pandemic levels. However, it is important to note that given pre-existing trends of rising cancer incidence, we would expect to be exceeding 2019 levels as a matter of course even without the impact of COVID-19. Simply returning to pre-pandemic levels is not meeting patient need nor helping us progress in diagnosing cancers earlier as per the LTP commitment.

There are challenges in assessing what changes in care may mean for longer term outcomes and delays to presentation, diagnosis and treatment will see significant variation in impact across different cancer sites. Long-standing issues with the slow pace that important data, such as staging data, is collated, analysed and published is also a significant barrier to our understanding.

Nevertheless, it is clear that delays to diagnoses and changes to treatment plans could potentially negatively affect outcomes. The substantial disruption across screening, urgent cancer referrals, tests and cancer treatment across this period means that **ambitions to diagnose more cancers earlier – vital for improving cancer survival – are likely to have been set back.**

^c April 2020 – March 2021

Staff in the cancer workforce have also struggled with the pressure the health service has been under through the pandemic. The 2020 NHS Staff Survey found that 44% of staff reported feeling unwell as a result of work-related stress in the last 12 months, rising from 40.3% in 2019.³⁴ NHS Providers found that 92% of NHS Trusts had serious concerns about staff wellbeing, stress and burnout following the pandemic.³⁵ While the full impact of the pandemic on the wellbeing of the cancer workforce is not yet clear, evidence is emerging that suggests it will have a damaging effect on their retention. Polling suggests that one in four NHS staff in England say they are more likely to leave their jobs than a year ago.³⁶ Given staff shortages across the cancer workforce, even a fraction of these staff leaving would compound workforce challenges that – as outlined in the previous section of this paper – limit our capacity to transform cancer outcomes.

While the pandemic has significantly disrupted cancer services, there have also been positive developments. Faced with the unprecedented challenge of maintaining routine care while responding to a pandemic, the NHS has risen to the challenge and delivered a period of unprecedented innovation – innovations in clinical practice, as well as accelerated adoption and uptake of technologies to triage, diagnose and treat cancer patients.

- Across the NHS many face-to-face appointments have been replaced with the option of remote consultations, while innovative diagnostic tools such as colon capsule endoscopy and Cytosponge have been used to ensure that the most urgent patients can be triaged quickly onto treatment.
- Cancer Alliances, regional organisations that bring together key organisations involved in the cancer pathway, have served as exemplars of integrated care by bringing their area's cancer service providers together to share capacity through joint patient lists and centralised cancer hubs. This adaptability has been key to maintaining cancer services through the pandemic.
- Many patients have been able to access more treatment in the community or at home, while innovative approaches to radiotherapy have been rolled out meaning many more patients have required fewer doses of radiation in each treatment cycle.

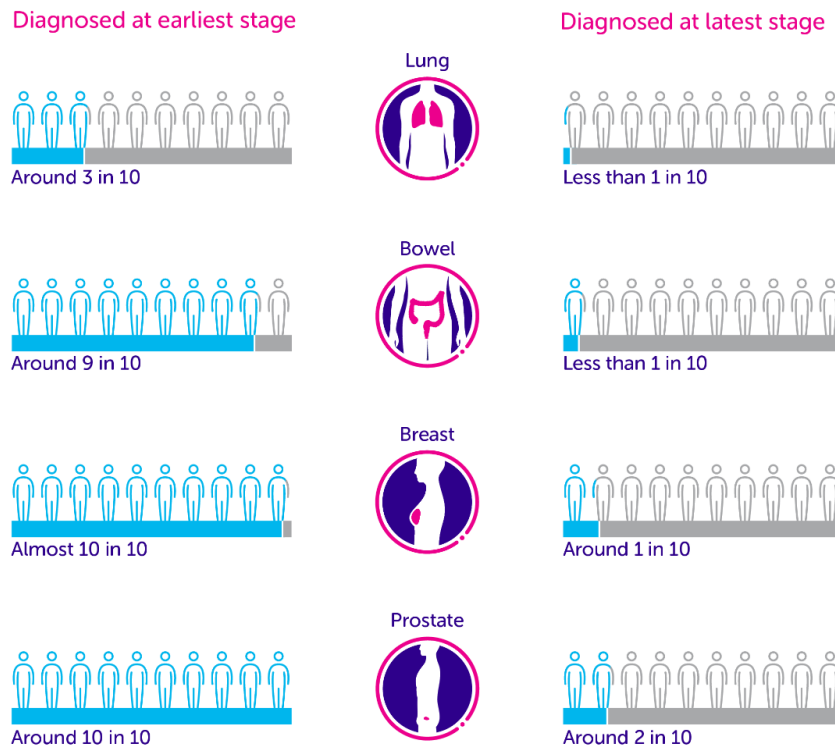
Many of these innovations were spurred by necessity and ensuring continuity of care, will not be appropriate for every patient and will need further, ongoing evaluation to understand their impact and effectiveness in the longer term. Nevertheless, there are clear potential benefits to continuing to offer patients a range of options for consultations that may improve access, deploying new triage tools, sharing capacity across different providers and offering kinder cancer treatments that require fewer trips to hospital. Innovation is at the heart of transformation in cancer services and improving outcomes, and the pandemic has proven that the NHS is able to innovate at a once unthinkable pace and scale – if empowered to do so.

3. Will implementing the Long Term Plan for cancer improve cancer outcomes to the level of the best countries internationally?

At the heart of the NHS Long Term Plan for cancer is an ambition to see 75% of all cancer patients diagnosed at Stage I or II by 2028, a goal that was supported by the Government.^{37,38} This ambition rightly recognised that diagnosing cancer at its earliest stages gives patients the best chance of accessing curative treatments options, and would ultimately accelerate improvements in cancer outcomes.

Cancer survival by stage at diagnosis

Proportion of people surviving their cancer for ten years or more



Earliest stage = stage 1; latest stage = stage 4 (*stage 3 for lung cancer, as a stage 4 estimate is unavailable)
 Data are non age-standardised net survival for adults (aged 15 to 99 years) diagnosed in East of England in 2007-2017 followed up to January 2019
 Cancer survival by stage in the East of England, produced as part of the CRUK-PHE partnership in collaboration with NCRAS, 2021

cruk.org
 Together we will beat cancer

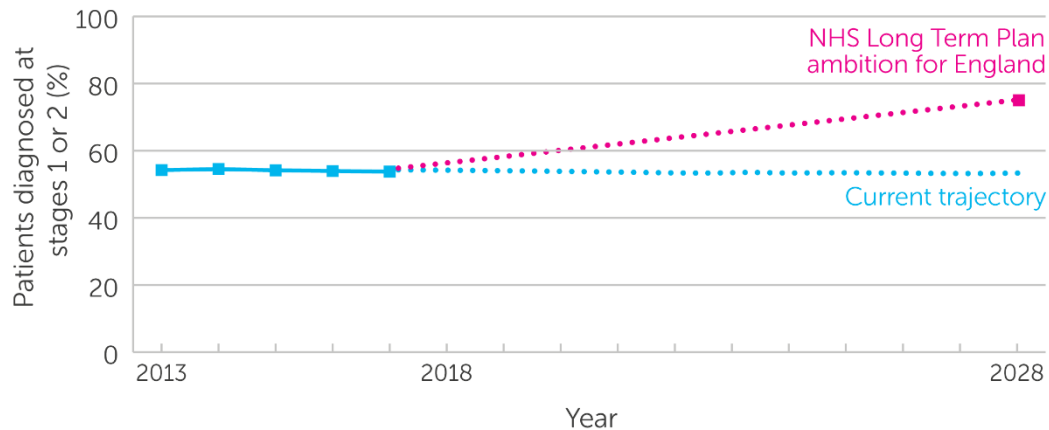


The importance of reducing the incidence of advanced cancer and meaningfully improving early diagnosis cannot be overstated. Therefore, if we are able to tackle the late stage diagnosis of cancer, and ensure more patients are diagnosed at the earliest, more treatable stages, then achieving the early diagnosis ambition of the NHS LTP could indeed help transform cancer outcomes in England and put cancer survival among the best comparable countries. However, **reaching this goal within the LTP timescale will be incredibly challenging**. Over the last decade the proportion of cancers diagnosed at Stage I and II has remained stubbornly stable, with only around 55% of cancer patients who could be staged being diagnosed at these stages in 2018.³⁹

On our current trajectory we will not achieve the LTP early diagnosis ambition, and the challenge of reaching this ambition is also only likely to increase in coming years. With a growing and ageing population, the number of people being diagnosed with cancer each year will increase – meaning we

estimate that by 2028, **to meet the 75% ambition the NHS in England will need to diagnose an extra 100,000 patients at an early stage each year.**⁴⁰ Older cancer patients are also likely to have a greater number of co-morbidities, meaning the care they need will likely be increasingly complex.⁴¹

Observed and projected percentage of patients diagnosed at stage 1 or 2 in England



Cancers with known stage only.

Source: NCRAS (part of PHE) Staging data in England 2013-2018; Cancer Research UK projections 2019-2028.

As noted above, the current and ongoing impact of the COVID-19 pandemic will likely impact on efforts to meet the 75% early diagnosis ambition. Moreover, as we show below, it is highly unlikely that just implementing the interventions set out in the NHS LTP will deliver the stage shift at the heart of the 75% early diagnosis ambition.

This means that significant and concerted action will be needed in the remaining years of the NHS LTP, including and going further than the interventions set out, in order reach this ambition and deliver on its potential to improve cancer outcomes.

Achieving the NHS Long Term Plan early diagnosis ambition

To support our understanding of how we can reduce the burden of late stage cancer, and quantify the potential impact of interventions set out in the NHS LTP, Cancer Research UK has developed the 'Improving Early Diagnosis of Cancer Waterfall.' The Waterfall captures estimated contributions of broad early diagnosis interventions which could have the potential to drive all-cancer stage shift.

The Waterfall is based on data where it is available – such as estimates of the impact of screening interventions – and on expertise for other interventions where there is not currently reliable data.

As the Waterfall makes clear, **there is no single intervention that will improve early diagnosis** – action is needed on all fronts to make progress and ultimately improve cancer outcomes.

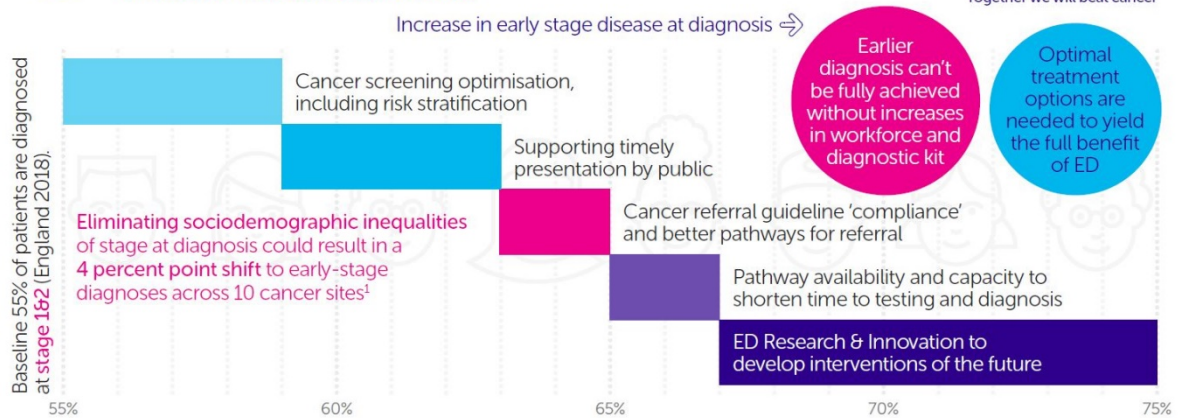


Improving Early Diagnosis of Cancer

No one thing will address late stage cancer – action is needed on all fronts



Together we will beat cancer



For more information please contact earlydiagnosis@cancer.org.uk

This is an illustrative diagram. Data have been used where available and expert input for the remaining areas. It will be updated as more evidence comes to the fore. Staging baseline data relate to England but estimates of impact on stage are relevant UK-wide.
 (1) Barclay, M. E., Abel, G. A., Greenberg, D. C., Rous, B. and Lyralzopoulos, G. (2021) Socio-demographic variation in stage at diagnosis of breast, bladder, colon, endometrial, lung, melanoma, prostate, rectal, renal and ovarian cancer in England and its population impact. British Journal of Cancer.

March 2021

For measures set out in the NHS Long Term Plan:

- Implementing and improving cancer screening programmes could help towards delivering a 4% increase in Stage I and II diagnoses.** The 2019 Richards review of screening services addresses key parts of screening including governance, data and uptake, and outlined important measures to optimise cancer screening.⁴² However, there has been no official NHS response to these recommendations, or detail on how they will be taken forward. Key review recommendations should be incorporated into a strategy for delivering on the LTP ambitions. The measures to optimise cancer screening that could help deliver this improvement includes:

 - Bowel screening** – In England, when bowel cancer is diagnosed via screening, almost two-thirds are diagnosed at Stage I or II; when diagnosed after presenting as an emergency, around 7 in 10 are diagnosed at stage III or IV.⁴³ **Optimising bowel screening, through age extension and increasing sensitivity, and improving informed uptake** could make a significant impact in improving early diagnosis of bowel cancer.
 - Early detection of lung cancer** – lung cancer is a disease of significant unmet need, with poorer outcomes than many other common cancers. Limited progress has been set back further by COVID-19. NHS England is currently running Targeted Lung Health Checks, and the National Screening Committee (NSC) is considering the evidence for targeted lung cancer screening. If the NSC recommends lung screening, **timely implementation will be essential, including wider consideration of capacity considerations** across diagnostic and treatment services.
- Supporting timely public presentation could help towards delivering a 4% increase in Stage I and II diagnoses.** Positive efforts have been made to improve public response to the signs and symptoms of cancer in recent years, for example through the Be Clear on Cancer campaigns and more recently through Help Us Help You. But there are missed opportunities to engage the

wider community in these efforts and explore different routes of engagement, including community mechanisms. Improvements are needed to data available on timely presentation – to help identify which demographic groups to target and to better assess the impact of activity.

- Researchers have estimated that eliminating sociodemographic inequalities in stage of cancer at diagnosis across 10 cancer sites could contribute a 4 percentage point increase in early stage diagnoses.⁴⁴ Action to support timely public presentation, including targeted and tailored approaches, would contribute to addressing this, as would activities to address inequalities in cancer screening uptake and ongoing engagement in, and movement through, testing and diagnosis.
- **Optimising recognition and referral – could help deliver a 2% increase in Stage I and II diagnoses.** In recent decades, iterative improvements and implementation of NICE referral guidelines have improved practice in cancer referrals. But a CRUK survey of GPs in England in March 2021 found that only 62% reported routinely using NG12 cancer referral guidelines, 27% report sometimes using the guidelines, 7% are aware of but don't use and 3% claim not to be aware, highlighting room for improvement.⁴⁵ Further efforts are needed to improve use of NG12 cancer referral guidelines by GPs, along with broader actions to support optimisation of recognition and referral.
- **Shortening the time to testing and diagnosis could help deliver a 2% increase in Stage I and II diagnoses.** Innovative models for diagnostic pathways, such as rapid diagnostic centres, can help optimise a patient's route from referral to diagnosis and considering pathway optimisation is important for all cancers. Innovative models for diagnostic services such as the Community Diagnostic Hubs being implemented following the Richards review of diagnostic services, offer the opportunity to provide protected elective capacity to diagnose cancer as well as a range of other conditions; **adequate resourcing for implementation will be vital to their success.**

As the Waterfall identifies, efforts to improve early diagnosis, and ultimately cancer outcomes, cannot be fully realised without expanding capacity in cancer services, which can be achieved through a multi-year investment in the cancer workforce and key equipment at the upcoming 2021 Comprehensive Spending Review.

The significant workforce gaps and lack of capacity in cancer services set out earlier in this paper have contributed to the slow progress against Long Term Plan implementation and more broadly improvements in cancer outcomes. An important example of the barrier to cancer transformation that workforce shortages and lack of diagnostic capacity creates can be found in bowel screening optimisation. As set out above, the LTP intends to increase the sensitivity of the faecal immunology test (FIT) for bowel screening, and increase the age range so that people are invited to bowel screening from the age of 50 to 74. However, due to shortages in the endoscopy workforce, FIT screening for bowel cancer had to be introduced in England at a less sensitive level than in Scotland. This means that more than 1,000 cancers and nearly 7,000 potentially pre-cancerous growths might be missed every year, compared to if England use the same sensitivity as used in Scotland.⁴⁶ Though age extension in England has now begun, we anticipate it will be a number of years before the

ambition to reduce the starting age to 50 will be achieved as the NHS balances demand and service capacity.

Accelerating progress towards world beating cancer outcomes through innovation

The Waterfall also makes clear that though interventions set out in the LTP will support significant progress if fully implemented, there remains a significant gap between what is set out and the ambition which it seeks to achieve. This demands we must go further and faster – which can only be delivered through **an acceleration of progress in cancer research**. If efforts are made to **better embed research** within the NHS, and ensure the **NHS has the capability and capacity to implement new technologies and interventions**, innovation will play an important role in bridging the gap to the LTP early diagnosis target.

A paradigm shift is needed in our ability to accurately detect and diagnose cancer at earlier stages.

There are many gains to be won and promising areas of research, such as better understanding the biology of early cancer, research into screening and diagnosis, investigating earlier referral and data science for early detection and diagnosis. However, significant barriers remain to unlocking the full potential of early detection and diagnosis (ED&D) research, with a number of critical improvements required:

- **Improved and increased use of data.** This will help identify those at most risk and is an area in which the UK could be a world leader – but there needs to be a significant boost in investment to accelerate robust collection, interoperability and access to patient data. This must go hand-in-hand with a much stronger focus on, and investment in, meaningful and ongoing public engagement and involvement activities.
- **Address the lack of clarity in regulatory and adoption pathways** - there is no current mandate for adoption of tests approved by NICE and no clear threshold of performance to be achieved by tests in development. This has also contributed to a **chronic under-prioritisation and therefore under-funding by both private and public sectors**, linked to a historic undervaluing of ED&D technologies by the healthcare system leading to a market failure.
- **The NHS is also built to treat symptomatic patients and limited capacity is already under pressure.** It is under-staffed and under-trained to deliver effective ED&D approaches; workforce bottlenecks will be exacerbated as new ED&D tools come online; and there is insufficient NHS budget dedicated to implementation of ED&D. Moreover, though new technologies will play an important role in cancer transformation, it is also important to recognise that innovations in clinical practice and service delivery – such as the Community Diagnostic Hub model – can also play an important role not only in service improvement but also in supporting research in the NHS. Ensuring sufficient capacity in terms of workforce and kit to fully implement innovative service models as well as trial and roll out new technologies and interventions is also vital.

Fundamental to expanding capacity for clinical research in the NHS is creating time for research for all healthcare professionals. However, for many staff, research is presented as an over-bearing add on, despite studies showing participation in research improves staff retention and morale.⁴⁷ This weak research culture has made research inaccessible for many NHS professions, particularly nurses, midwives, and Allied Health Professionals (AHPs). Research commissioned by Cancer Research UK

found that a range of barriers exist preventing clinical staff from engaging in research, including staff overburden with clinical duties, regional disparities in research investment and barriers to research for some professions, and a fundamental and pervasive cultural barrier that perceives research as valuable but burdensome.⁴⁸ To tackle these barriers, research must be embedded in career pathways and organisational culture, along with improving accessibility and protecting time for all health service staff to support research, no matter their profession or organisation.

It is important to recognise that it will take some time to fully understand the contribution that innovative technologies will make to efforts to improve early diagnosis. Therefore, robust trials and evaluation must be built in to assess new interventions, and equal access for all promising approaches and technologies must also be ensured, so that no opportunities are missed. CRUK will continue to assess the early detection and diagnosis landscape, and will update our assessments in the Waterfall accordingly.

Nevertheless, though many EDD technologies and interventions will not offer their full value in the short term, there are still clear benefits to research participation for cancer patients. Evidence suggests that **clinical research activity is a driver for high quality cancer care**, with better outcomes for patients today who are treated in research-intensive hospitals.⁴⁹ Therefore, there are gains beyond advancing research progress to ensuring research is better embedded within the NHS and to ensuring the NHS has the capability and capacity to conduct research.

The LTP commits to extending the use of molecular diagnostics and routinely offering genomic testing to all people with cancer for whom it would be of clinical benefit. The Genome UK 2021-22 implementation further emphasises the LTP ambition that by 2023 over 100,000 people a year can access whole genome sequencing. These commitments are welcome and with the combination of the UK's excellent genomic scientific capabilities and the establishment of the Genomic Medicine Service, there is an opportunity to improve cancer outcomes for patients across England while future proofing the health service by improving the ability to increasingly match patients with optimal treatments available to them. **To achieve this, the Government and NHS England must ensure the Genomic Medicine Service has the capacity to deliver equitable and fast access to genomic tests and targeted medicines for cancer patients in England.**

The LTP also sets out the ambition to expand participation in research enabled by genomic testing. To achieve this, patients who receive genomic testing must be able to be matched with ongoing research and clinical trials. Furthermore, mechanisms for data sharing between the Genomic Lab Hubs and trial sites must be smooth and equitable across the country. This has the potential to improve treatment options and consequently cancer outcomes as well as benefitting clinical research. A key ambition of the Genomic Medicine Service is to support genomic research. **This will require a clear process which should provide clarity on issues such as data sharing, workforce and staff capacity, patient consent, and timelines.**

Cancer Research UK (CRUK) is the world's largest cancer charity dedicated to saving lives through research. We support research into over 200 types of cancer, and our vision is to bring forward the day when all cancers are cured. Our long-term investment in state-of-the-art facilities has helped to create a thriving network of research at 90 laboratories and institutions in more than 40 towns and cities across the UK supporting the work of over 4,000 scientists, doctors and nurses. In 2020/21, Cancer Research UK invested £421 million on new and ongoing research projects into the causes and treatments for cancer.

For more information, or any questions, please contact Matt Sample (Health Policy Manager) – Matt.Sample@cancer.org.uk

References

- ¹ Ahmad AS, Ormiston-Smith N, Sasieni PD. Trends in the lifetime risk of developing cancer in Great Britain: comparison of risk for those born from 1930 to 1960. *Br J Cancer*. 2015 Mar 3;112(5):943-7. doi: 10.1038/bjc.2014.606. Epub 2015 Feb 3. PMID: 25647015; PMCID: PMC4453943.
- ² Conservative Party. 2019. The Conservative and Unionist Party Manifesto 2019. Accessed August 2021 via https://assets-global.website-files.com/5da42e2cae7ebd3f8bde353c/5dda924905da587992a064ba_Conservative%202019%20Manifesto.pdf.
- ³ NHS England. 2021. Cancer Waiting Times. Accessed August 2021 via <https://www.england.nhs.uk/statistics/statistical-work-areas/cancer-waiting-times/>.
- ⁴ Cancer Research UK. 2020. Cancer incidence for all cancers combined. Accessed September 2021 via <https://www.cancerresearchuk.org/health-professional/cancer-statistics/incidence/all-cancers-combined>.
- ⁵ Maddams, J. et al. 2012. Projections of cancer prevalence in the United Kingdom, 2010-2040. *British Journal of Cancer*. Accessed June 2021 via <https://pubmed.ncbi.nlm.nih.gov/22892390/>.
- ⁶ Richards, M. (October 2020). *Diagnostics: Recovery and Renewal. Report of the Independent Review of Diagnostic Services for NHS England*. Available: <https://www.england.nhs.uk/wp-content/uploads/2020/11/diagnostics-recovery-and-renewal-independent-review-of-diagnostic-services-for-nhs-england-2.pdf>
- ⁷ Quaresma M, Coleman MP, Rachet B. 40-year trends in an index of survival for all cancers combined and survival adjusted for age and sex for each cancer in England and Wales, 1971-2011: a population-based study. *Lancet* 2014 pii: S0140-6736(14)61396-9.; ISD Scotland. Trends in Cancer Survival 1983-2007.; Northern Ireland Cancer Registry. Incidence & Survival 1993-2012(link is external).
- ⁸ Richards, M. et al. 2018. Unfinished Business: An assessment of the national approach to improving cancer services in England 1995–2015. Accessed August 2021 via <https://www.health.org.uk/publications/unfinished-business>.
- ⁹ International Cancer Benchmarking Partnership. 2021. Distribution by stage. Accessed August 2021 via <https://gco.iarc.fr/survival/survmark/visualizations/viz8>.
- ¹⁰ International Cancer Benchmarking Partnership. 2016. Evidence for policy and practice. Accessed August 2021 via https://www.cancerresearchuk.org/sites/default/files/icbp_showcase_report_web.pdf.
- ¹¹ NHS England and Improvement. 2019. Interim NHS People Plan. Accessed August 2021 via https://www.longtermplan.nhs.uk/wp-content/uploads/2019/05/Interim-NHS-People-Plan_June2019.pdf
- ¹² <https://www.bma.org.uk/media/4316/bma-medical-staffing-report-in-england-july-2021.pdf>
- ¹³ RCR. 2021. Royal College of Radiologists Census 2020. Accessed August 2021 via https://www.rcr.ac.uk/system/files/publication/field_publication_files/clinical-radiology-uk-workforce-census-2020-report.pdf.
- ¹⁴ https://www.rcr.ac.uk/system/files/publication/field_publication_files/clinical-oncology-uk-workforce-census-2020-report.pdf
- ¹⁵ https://www.rcr.ac.uk/system/files/publication/field_publication_files/clinical-oncology-uk-workforce-census-2020-report.pdf
- ¹⁶ RCR. 2021. Royal College of Radiologists Census 2020. Accessed August 2021 via https://www.rcr.ac.uk/system/files/publication/field_publication_files/clinical-radiology-uk-workforce-census-2020-report.pdf
- ¹⁷RCR. 2021. Royal College of Radiologists Census 2020. Accessed August 2021 via https://www.rcr.ac.uk/system/files/publication/field_publication_files/clinical-radiology-uk-workforce-census-2020-report.pdf
- ¹⁸ J. George, E. Gkousis, A. Feast, S. Morris, J. Pollard & J. Vohra. 2020. Estimating the cost of growing the NHS cancer workforce in England by 2029. Accessed August 2021 via https://www.cancerresearchuk.org/sites/default/files/estimating_the_cost_of_growing_the_nhs_cancer_workforce_in_england_by_2029_october_2020_-_full_report.pdf
- ¹⁹ OECD. 2019. Health at a Glance 2019: OECD Indicators. Accessed via <https://www.oecd-ilibrary.org/social-issues->

[migration-health/health-at-a-glance-2019_4dd50c09-en;jsessionid=Yc5fHtz1KVuoFQjYGpuL7l8h.ip-10-240-5-138](https://doi.org/10.1093/intqhc/mzaa166)

²⁰ Lynch, C. et al. 2021. A comparative analysis: international variation in PET-CT service provision in oncology—an International Cancer Benchmarking Partnership study, *International Journal for Quality in Health Care*, 33:1. <https://doi.org/10.1093/intqhc/mzaa166>

²¹ Kraindler, J., Gershlick, B., and Charlesworth, A. 2019. Failing to capitalise: Capital spending in the NHS, Health Foundation. Accessed via <https://health.org.uk/publications/reports/failing-to-capitalise/>

²² Dalton, J. (December 2018). 'NHS 'doesn't have enough scanners' to roll out new hi-tech method of detecting prostate cancer', *The Independent*. Available: <https://www.independent.co.uk/news/uk/home-news/prostate-cancer-nhs-scan-mri-treatment-biopsy-diagnosis-a8678501.html>

²³ Richards, M. (October 2020). *Diagnostics: Recovery and Renewal. Report of the Independent Review of Diagnostic Services for NHS England*. Available: <https://www.england.nhs.uk/wp-content/uploads/2020/11/diagnostics-recovery-and-renewal-independent-review-of-diagnostic-services-for-nhs-england-2.pdf>

²⁴ Richards, M. (October 2020). *Diagnostics: Recovery and Renewal. Report of the Independent Review of Diagnostic Services for NHS England*. Available: <https://www.england.nhs.uk/wp-content/uploads/2020/11/diagnostics-recovery-and-renewal-independent-review-of-diagnostic-services-for-nhs-england-2.pdf>

²⁵ Ede, R. and Phillips, S. (July 2021). *A Wait on your Mind? A realistic proposal for tackling the elective backlog*, Policy Exchange. Available: <https://policyexchange.org.uk/publication/a-wait-on-your-mind/>

²⁶ Richards, M. (October 2019). *Report of the Independent Review of Adult Screening Programmes in England*. Available: <https://www.england.nhs.uk/wp-content/uploads/2019/02/report-of-the-independent-review-of-adult-screening-programme-in-england.pdf>

²⁷ Mazidimoradi A, Tiznobaik A, Salehiniya H. Impact of the COVID-19 Pandemic on Colorectal Cancer Screening: a Systematic Review. *J Gastrointest Cancer*. 2021 Aug 18:1–15. doi: 10.1007/s12029-021-00679-x. Epub ahead of print. PMID: 34406626; PMCID: PMC8371036.

²⁸ Australian Government. 2020. Cancer screening and COVID-19 in Australia. Accessed August 2021 via <https://www.aihw.gov.au/reports/cancer-screening/cancer-screening-and-covid-19-in-australia/contents/how-has-covid-19-affected-australias-cancer-screening-programs>.

²⁹ Cancer Research UK analysis of Cancer Waiting Times data for England. For full analysis, see - https://www.cancerresearchuk.org/sites/default/files/cruk_covid_and_cancer_key_stats_june_2021.pdf.

³⁰ CRUK estimate based on pre-pandemic averages of the number of people screened with FIT/FOBT bowel screening, breast screening mammogram and cervical smear programmes across the UK countries.

³¹ Cancer Research UK analysis of Cancer Waiting Times data for England. For full analysis, see - https://www.cancerresearchuk.org/sites/default/files/cruk_covid_and_cancer_key_stats_june_2021.pdf.

³² Ide-Walters, C. et al. 2021. Cancer Research UK's Cancer Patient Survey. CRUK's second survey studying the impact of COVID-19 on cancer patients in the UK. Accessed August 2021 via https://www.cancerresearchuk.org/sites/default/files/cancer-stats/cruk_patient_survey/cruk_patient_survey.pdf.

³³ Ide-Walters, C. et al. 2021. Cancer Research UK's Cancer Patient Survey. CRUK's second survey studying the impact of COVID-19 on cancer patients in the UK. Accessed August 2021 via https://www.cancerresearchuk.org/sites/default/files/cancer-stats/cruk_patient_survey/cruk_patient_survey.pdf.

³⁴ NHS England. NHS Staff Survey 2020 National Results Briefing. March 2021 via <https://www.nhsstaffsurveyresults.com/wp-content/uploads/2021/03/ST20-national-briefing-doc.pdf>

³⁵ NHS Providers. The Impact of the pandemic on the workforce. Accessed August 2021 via <https://nhsproviders.org/recovery-position-what-next-for-the-nhs/the-impact-of-the-pandemic-on-the-workforce>

³⁶ P. Patel, C. Thomas. IPPR. Recover, Reward, Renew. Accessed August 2021 via <https://www.ippr.org/files/2021-03/recover-reward-renew-march-21.pdf>

³⁷ Prime Minister's speech to Conservative Party Conference 2018. Accessed July 2021 via <https://www.youtube.com/watch?v=nhSjoCrrWc>.

³⁸ NHS England. 2019. The NHS Long Term Plan. Accessed July 2021 via <https://www.longtermplan.nhs.uk/wp-content/uploads/2019/08/nhs-long-term-plan-version-1.2.pdf>.

³⁹ Public Health England. 2021. National Disease Registration Service: Staging data in England. Accessed July 2021 via https://www.cancerdata.nhs.uk/stage_at_diagnosis.

⁴⁰ Projections based on incidence projections to 2028 in England from Smittenaar et al. 2016.

⁴¹ Kingston, A. 2018. Projections of multi-morbidity in the older population in England to 2035: estimates from the Population Ageing and Care Simulation (PACSim) model. Accessed July 2021 via <https://academic.oup.com/ageing/article/47/3/374/4815738>.

⁴² Richards, M. 2019. Independent Review of Adult Screening Programmes in England. Accessed August 2021 via <https://www.england.nhs.uk/wp-content/uploads/2019/02/report-of-the-independent-review-of-adult-screening-programme-in-england.pdf>.

⁴³ Cancer Research UK. 2021. Bowel Cancer Statistics. Accessed July 2021 via <https://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/bowel-cancer>.

⁴⁴ Barclay, M.E. et al. 2021. Socio-demographic variation in stage at diagnosis of breast, bladder, colon, endometrial, lung, melanoma, prostate, rectal, renal and ovarian cancer in England and its population impact. Accessed August 2021 via

<https://www.nature.com/articles/s41416-021-01279-z>.

⁴⁵ Findings from CRUK GP Survey March 2021

⁴⁶ Internal CRUK analysis with estimates are based on the rate of participation and the cancer detection rate for the relevant threshold from the England FIT pilot in 2014 (data based on Moss et al., Gut; 2016), and assume 4.6 million screening programme invites for 60-74 years olds in England per year. Estimates are for the years immediately following the introduction of FIT.

⁴⁷ Peckham, S., et al. 2021. Creating Time for Research: Identifying and improving the capacity of healthcare staff to conduct research. Accessed May 2021 via

https://www.cancerresearchuk.org/sites/default/files/creating_time_for_research_february_2021_-_full_report-v2.pdf.

⁴⁸ Peckham, S., et al. 2021. Creating Time for Research: Identifying and improving the capacity of healthcare staff to conduct research. Accessed May 2021 via

https://www.cancerresearchuk.org/sites/default/files/creating_time_for_research_february_2021_-_full_report-v2.pdf.

⁴⁹ Jonker, L. and Fisher, S.J. 2018. The correlation between National Health Service trusts' clinical trial activity and both mortality rates and care quality commission ratings: a retrospective cross-sectional study. *Public Health*, 157., pp. 1-6.

Sept 2021