Royal College of Radiologists: Comprehensive Spending Review Representation

September 2024

About the RCR

1. The Royal College of Radiologists is the UK's professional membership body for clinical radiologists and clinical oncologists.

2. Clinical radiologists are specialist doctors who use medical imaging to diagnose, monitor and treat benign and malignant diseases and injuries. They are the backbone of the NHS, responsible for the vast majority of diagnoses made and the modern management of patients. Interventional radiologists, a subspecialty of clinical radiology, undertake minimally invasive and potentially life saving surgical treatments. Clinical oncologists are specialist doctors who are responsible for cancer management. They deliver cutting-edge treatments such as radiotherapy and systemic anti-cancer therapies, including chemotherapy.

3. The UK is experiencing the early stages of a boom in demand for healthcare. Analyses show that rates of ill health are set to increase drastically, driven both by increased prevalence of less healthy lifestyles and age-related sickness. The Health Foundation estimate that by 2040 the number of people in England living with major illness will increase by 37% - but that the working age population will only increase by 4%. The number of diagnosed cases of cancer is set to increase by 31% over that time.[i]

4. This is a challenging context, with increased demand for care coinciding with fewer resources to deploy to provide that care. However, solutions exist: diagnosing illnesses earlier, highly targeted interventions, innovative technologies, and efficient ways of working.

5. We here set out some cost-effective investments in diagnostics and cancer services that would empower the NHS to achieve its ambitions of reducing waiting lists, boosting early detection and treatment of major conditions, and improving the health and wellbeing the nation.

iRefer Clinical Decision Support

6. Completing the rollout of iRefer Clinical Decision Support (CDS):

Policy	NHS England should be supported to **complete the rollout of iRefer CDS to all Trusts**, and should receive funding to **expand the use of**

	iRefer to A&E departments and across non-imaging diagnostic modalities, in order to further drive up productivity.
Explanation	iRefer CDS is a clinical decision support system and accompanying set of evidence-based clinical radiology referral guidelines whose aim is to help healthcare professionals determine the right imaging test to request for their patients, first time. iRefer benefits both clinicians and patients by: • Supporting rapid diagnosis by ensuring the most appropriate imaging test is requested and conducted at the right time • Driving up productivity by eliminating unhelpful or repeat imaging investigations • Promoting the best use of resources to avoid waste and support a sustainable service • Promoting uniform and best care for patients • Protecting patients from unnecessary ionising radiation. The iRefer CDS is being rolled out across the NHS, in both primary and secondary care settings, as part of DHSC's initiative to level up diagnostic capacity. iRefer is now used in 65 NHSE trusts via the integrated CDS; it is also available via the iRefer website (for which trusts purchase subscriptions). After the 2020 Spending Review, the NHS received £22 million to purchase iRefer licenses for all trusts for a period of three years. Across those trusts who have subsequently adopted iRefer we have seen an **average reduction in inappropriate referrals of 10-15%** through changed (6-8%) and cancelled (3-6%) imaging requests. This has led to **cost avoidance savings of up to £330,000 per year** in trusts using the iRefer tool. During that Spending Review, funding was allocated for three years' worth of iRefer subscriptions. The initial bid had requested five years' funding to allow for the lengthy and complex deployment stage. Deployment can take a year or more, with some organisations opting to phase in iRefer gradually (i.e. across just primary care first, or in some imaging modalities first.) Here we present a series of recommendations for the next phase of the iRefer project. If funded, these actions would enable iRefer coverage to expand to 100% of NHS Trusts and would further expand the productivity gains to be made by deploying the iRefer CDS. **The RCR has worked in collaboration with NHS England's Digital Capability Programme to develop these recommendations.** The NHSE Transformation Directorate is also making a submission to this Spending Review, which will include recommendations on iRefer;

	these are the same as our recommendations in this document, and the two should be understood as identical and supportive bids.
Costings	**One: Extension of previous funding arrangements to allow the remaining eligible Trusts to avail of iRefer.** • The cost of a year's iRefer license, plus maintenance and support is £4.35 million for all remaining eligible Trusts. • The one-off cost of implementation is £4.3 million for all remaining eligible Trusts. • Therefore across five years, the total cost is 4.3 + (4.35*5) = **£26.05 million.** • We would suggest adding a 15% contingency to this amount to account for associated costs to Trusts, such as third-party fees from suppliers, integrators, networks, and non-ICE integrations. iRefer cannot be deployed unless a suitable order comms platform, such as Clinisys, is first in place. Additional funding is needed if such a platform must be procured in addition to iRefer CDS. **Two: Extension of existing iRefer subscriptions by two years** • This extension would enable Trusts currently using iRefer to continue to do so for another two years, and thereby realise greater benefit in terms of cost avoidance, productivity and patient care. • It would enable Trusts currently midway through deployment to finalise the process and begin to use iRefer in clinical practice. The RCR believes that these additional two years are important as part of the initial funding allocation, rather than as a move towards 'business as usual' funding, because in some cases three years was insufficient to properly establish iRefer. • The cost of renewing iRefer for all Trusts currently using it for two years would be **£8.7 million**. **Three: Expansion of iRefer to all NHSE A&E departments to boost productivity by eliminating unnecessary, low-value CT scans** • Analysis by NHS England has revealed a significant rise (48%) in the number of unscheduled diagnostics activity since 2019/20, of which the greatest component is unscheduled CT scans in urgency and emergency care.[ii] • This is cutting into the expanded diagnostics capacity brought about following the 2021 Spending Review. Of the 1,309,000 additional key tests performed in Q1/Q2 23/24 versus Q1/Q2 19/20, 903,000 were unscheduled tests. Community Diagnostic Centres performed 443,000 elective tests, enabling acute trusts to cover the growth in unscheduled activity. In other words, only around half of CDC activity was additional, given its impact on the diagnostics waiting list.

	• NHS England modelling suggests that if this trend continues, it will be challenging for the NHS to meet the March 2025 target for achieving 95% of patients receive their diagnostic test within 6 weeks. • One response is to reduce the unwarranted use of CT imaging in A&E departments, to free up capacity for elective tests and high-value unscheduled tests. • NHS England found from pilot trials in Milton Keynes and the Princess Alexandra that the iRefer CDS led to the potential to cancel 3% and 2.7% of CT tests requested in A&E departments, respectively. • It is therefore recommended that iRefer CDS is rolled out to all A&E departments across England, at a cost of **£9 million**[ii]. This would cover the 28 Trusts that have already implemented iRefer in primary care, but have yet to extend it to secondary care. **Four: Expansion of iRefer to cover all diagnostics modalities** • iRefer CDS is currently restricted to diagnostic imaging. However, there is the potential to expand it to cover all diagnostic modalities. • [redacted] of NHS England made a presentation to the Academy of Medical Royal Colleges in July 2024, which set out various options for optimising demand for diagnostics.[iii] Central to the proposal was to support decision-making on test referrals by expanding the availability and domain of iRefer. • The RCR is co-operating a pilot programme with the British Society of Echocardiography, in which iRefer will be expanded to cover echocardiogram tests. This is progressing well, with content format agreed and shared with the CDS providers. The aim is to establish a proof of concept for a wider project involving stakeholders for the other diagnostic modalities. • As the RCR holds the relationships with MedCurrent and xWave, the managers of the iRefer CDS, and because the RCR has firsthand experience with deploying iRefer, it is proposed that the RCR would provide a project management function to expand iRefer further to additional diagnostic modalities (pathology, lung function testing, audiology, endoscopy etc.). • The RCR would provide a cohesive approach and act as a single point of contact with the CDS vendors. This would ensure high quality standards and consistency in deployment and application. • It is estimated that this project would take two years, at a cost of **£1.3 million.** This cost would enable the RCR to hire the expert staff and meet the administrative costs required to manage the project. We estimate two years would be required

	to agree the content format with the relevant stakeholders, work with the CDS vendors to integrate the information, and test the new modalities in iRefer.
Impact	iRefer is a highly effective tool for boosting appropriate imaging requests, delivering early and effective diagnoses for patients, reducing inappropriate radiation exposure, and unlocking genuine cost savings to the NHS. By enabling the avoidance of inappropriate costs, iRefer allows trusts and GP practices to reduce waste and to redirect funds towards patient care and other improvement projects. This is essential, given the rise in demand for healthcare that is projected over the next few decades. Too often, the NHS is geared up to only support innovation. iRefer is an exemplar case for investing in transforming 'business as usual' via sustained investment. Completing and sustaining the rollout of iRefer is sensible investment to deliver genuine value; abandoning the rollout of iRefer before it has reached 100% coverage would represent a lost opportunity and a waste of the investment made thus far.

Expanding workforce capacity

7. The greatest barrier to meeting the healthcare needs of the future is the workforce crisis in the NHS. This issue affects radiology and oncology particularly acutely.

8. Investing in the clinical radiology workforce

Policy	For the next three years (2025-2028), the Government should commit a pot of **£25 million** of funding to fully cover the costs of the first two years (out of seven) of **100 radiology specialty training expansion posts.**
Explanation	In an effort to cut waiting lists and increase early diagnosis rates, the Government has committed to a 'Fit for the Future' fund, to double the number of CT and MRI scanners in the NHS. We are fully supportive of this and welcome the Secretary of State's revised costings for the policy. However, we are concerned that a failure to commensurately invest in the imaging workforce may limit the policy's success and impact. Expanding machine capacity, without increasing the number of radiologists to report the increased level of scans, or the staff to operate them, will likely result in patients waiting longer for a diagnosis, or the machines going unused. Our latest workforce census found that we now have a 30% shortfall of radiologists, equivalent to 1,962 consultants. This is set against a backdrop of significantly rising imaging demand and comparatively slow workforce growth. In 2023, the number of CT and MRI scans rose by 11%, and the radiology consultant workforce by 6.5%.[iv]

Patients are now facing backlogs and delays at every stage of the diagnostic pathway. The target for 99% of patients to wait less than six weeks for an imaging scan is consistently missed. Similarly, we are failing to meet turnaround time targets, whereby 100% of imaging examinations should be reported within four weeks of the scan. In 2023, nearly three quarters of a million patients waited longer than a month for the results of their scan; this is a direct indication of radiologists' capacity. The NHS Long Term Plan includes a central ambition to diagnose 75% of cancers at stage 1 or 2 by 2028. Progress against this target has been slow and significantly more will be needed if this is to be met in four years' time.

As the Government doubles the number of scanners, and continues to invest in routes to diagnosis, imaging activity will continue to rise.

The impact of radiology shortfalls is not just patient delays. The NHS currently spends far too much on outsourcing budgets; in 2023, the NHS spent £286 million on managing excess reporting demand, including outsourcing to private providers. This has its own challenges. While outsourcing may address the immediate capacity challenge, there is evidence that these practices can contribute to inefficiencies downstream; for example, it is less straightforward for a clinician to have a detailed conversation with the radiologist who reported the scan, should they need to do so. This can mean scans have to be re-reported, therefore duplicating the work.

The challenge of demand outpacing workforce growth has been recognised by the NHS, this Government and previous Governments. A much-needed expansion of radiology specialty training posts has been repeated over the past years. However, radiology departments are now struggling to accept these expansion posts due to local financial challenges. This means that expansion posts are now being taken away from radiology, despite the well documented issues.

In both 2021 and 2022, NHS England introduced an expansion of 100 clinical radiology training places. However, despite the clear need, training programmes were only able to offer 84 of these posts. As a result, in 2023, NHS England reduced the number of expansion posts for 2024 recruitment to 75.

For context, under current funding arrangements, NHS England centrally funds 50% of a training post, while the local trust funds the remaining 50%. In comparison, in the devolved nations, training posts are fully funded by the central NHS body, while local departments pay on call requirements. We asked radiology leaders what barriers they faced when expanding training places; 82% said local funding was an issue for expanding places in their area. Radiology is a highly competitive specialty (8.77 applicants for every 1 position), so filling these posts would not be a challenge.

We are now not training enough radiologists to meet rising demand.

<table>
<tr><td></td><td>We are therefore proposing that the Government takes action to intervene by fully funding the first two years of 100 clinical radiology training expansion posts. As an emergency, short-term measure, this should be repeated for three years to sustainably build the workforce.

Such an investment does have precedent. A similar pot of funding (the Additional Roles Reimbursement Scheme) was previously announced to support the 2019 Conservative government's manifesto ambition to increase access to primary care. A central ambition of your government and department is to cut waiting lists and achieve earlier diagnosis. Adopting this policy would not only help you to move towards these goals, but also foster your relationship with medical leaders of the future.</td></tr>
<tr><td>Costings</td><td>We are calling for a one-off investment of £25 million, to fund the costs of the first two years of 300 radiology expansion posts, split into three annual investments to cover 100 clinical radiology posts per year:

<table>
<tr><th>Description</th><th>Cost</th></tr>
<tr><td>Radiology trainee ST1-2 salary (Nodal point 3)</td><td>£49,909[v]</td></tr>
<tr><td>Estimated employer NI costs</td><td>£5,632[vi]</td></tr>
<tr><td>Estimated employer pension costs</td><td>£13,625[vii]</td></tr>
<tr><td>Placement fee</td><td>£12,637</td></tr>
<tr><td>Total cost per trainee per annum</td><td>£81,803</td></tr>
<tr><td>Total cost per trainee for two years</td><td>£163,606</td></tr>
<tr><td>NHS currently funds half of a training post already. The additional cost of funding two years per trainee</td><td>£81,803</td></tr>
<tr><td>We are calling for 100 expansion posts to be 100% funded for two years</td><td>£8,180,300</td></tr>
<tr><td>To catch up shortfalls, this should be repeated for 3 years</td><td>£24,540,900</td></tr>
</table></td></tr>
<tr><td>Impact</td><td>Achieving an early diagnosis is the linchpin of effective healthcare. Earlier diagnoses means that patients have access to more treatment options and makes it more likely that their condition can be cured, or effects lessened.

Investing in the workforce will also help the NHS towards financial stability, by reducing the cost of outsourcing. The RCR estimates that the £276mn spent on outsourcing, insourcing and locums in 2023 could have paid for 2,690 consultant salaries.[iv] Building the domestic workforce is the only sustainable solution to addressing the radiology workforce crisis.</td></tr>
</table>

	Trusts must therefore be encouraged to take up the radiology specialty training posts on offer. By fronting this initial two-year cost, trusts and finance directors will be incentivised to fund the remaining three/four years of the training place. In turn, this will increase the pool of radiology trainees, and future doctors. Trainees perform critical duties – and by increasing their number, this will in turn expand capacity to report scans, and free up time for consultants to take on non-clinical responsibilities including service development. Service development covers a large variety of activities, including leadership, clinical research, embedding technological advances, teaching and education, and quality standards. In turn, this will improve productivity and develop the service in line with future innovations including AI.

9. Investing in the clinical oncology workforce

Policy	To catch up the oncology workforce shortfall, **185 consultant posts should be funded for one year and made available for trainees** to graduate into, at a cost of £25 million.
Explanation	According to the NHS, 1 in 2 people will develop some form of cancer in their lifetime.[viii] Oncologists are the cornerstone of cancer treatment delivery, and as demand for treatment continues to increase, so will the need for oncologists. The 2023 clinical oncology workforce census report found that we are now 185 consultants short of what is needed to deliver the best possible patient care.[ix] It is well recognised that these shortages impact the quality of patient care that doctors are able to provide. Rising demand for cancer services and treatment – for instance, the rate of SACT delivery increases by approximately 6-8% per year across the UK – means that recent workforce growth has simply not been enough. This shortfall, and its impact, has been rightly recognised by successive Governments and training places have been increased to address this. This means we now have a surge of trainees going through the system, soon to qualify. However, at the same time, local departments are refusing to expand the number of consultant positions due to local financial constraints. This is clearly unfair for trainees, who have provided services for the NHS for the past 7 years, and inefficient for the NHS, who have funded a trainee's past 7 years of training. A much-needed expansion of consultant posts is required to avoid a situation whereby newly qualified doctors are forced to take up positions elsewhere due to a lack of jobs in the United Kingdom.

<table>
<tr><td></td><td>To prevent more patients being delayed from starting or receiving their cancer treatment, we need a critical investment into the workforce.</td></tr>
<tr><td>Costings</td><td>We are asking for an investment of £25 million to fund an additional 185 clinical oncology consultant positions for the first year. These costs can be broken down into:

<table>
<tr><th>Description</th><th>Cost per consultant</th><th>Cost – 185 consultants</th></tr>
<tr><td>Consultant salary</td><td>£100,000</td><td>£18,500,000</td></tr>
<tr><td>Employer National Insurance and pension contributions (estimate)[x]</td><td>£35,000</td><td>£6,475,000</td></tr>
<tr><td>Total cost</td><td>£135,000</td><td>£24,975,000</td></tr>
</table>

This investment could be staggered over the course of three years to spread the financial costs, with 62/3 new posts funded each year. After this, local trusts would be expected to fund the consultant position, given the benefits they bring.</td></tr>
<tr><td>Impact</td><td>Workforce shortfalls are the largest driver of treatment delays, which has a clear impact on outcomes. There is evidence to show that a patient's health often deteriorates while on a waiting list. For every four weeks treatment for some cancers is delayed, the chance of cure falls by approximately 10%.[xi] If the consultant shortfall was eliminated, it is likely that cancer waiting times would be consistently met, patients would receive treatment at the optimal time, and cancer outcomes would improve as a result.

This policy would also give consultants the headspace and time to perform their non-clinical responsibilities, including training the future generation of doctors and developing the service. In 2023, 100% of heads of service said workforce shortfalls meant there was a lack of time for service development.[ix] As doctors cover additional clinical work, they do not have the time and headspace to develop and introduce innovative ways of working which may ultimately lead to increased quality of care and improved productivity.

Groundbreaking new treatments and technologies have huge potential for streamlining the delivery of care, improving patient outcomes, and expanding workforce capacity. Yet without the workforce to introduce these today, we will fall further behind on outcomes and fail to modernise the system in line with the population's advancing needs.</td></tr>
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Innovating patient pathways

10. There is huge potential to transform the ways in which the NHS provides care to patients by making systems and processes more efficient. Unlocking productivity gains in this way would empower the NHS to treat more patients to the highest standard of care.

11. Artificial Intelligence in diagnostics

Policy	The government and the NHS should take a **holistic, comprehensive approach to integrating AI** into NHS diagnostic services focusing on education and regulatory infrastructure.
Explanation	AI and other digital innovations have the potential to enable the NHS to deliver more, higher quality care to patients and to meet the rising demand for care. However, getting AI into routine usage across the spectrum of NHS diagnostic services is a significant challenge.[xii] To meet this challenge, targeted and coordinated action will be needed at all stages and levels of the deployment process:[xiii] • **Educational resources:** NHS staff, both clinical and non-clinical, will require additional educational support to enable them to quickly adopt AI tools with confidence, and to give them the ability to critically assess those tools' recommendations when making clinical decisions. The NHS Digital Academy is an ideal venue for such material, so should be adequately resourced to provide them. Royal College already plays a role in providing educational material for radiologists and oncologists. We would be strongly in favour of collaborating with NHSE and the AI Lab in jointly producing further such materials to support delivery of their own aims regarding AI education. • **AI Deployment Platform:** the RCR strongly urges NHSE to take forward the AIDP, using the learnings from the initial pilot programme to further roll out the software. The RCR is aware that the AI Lab plans to continue their work on the AIDP, and we strongly endorse this aim. Taking the learnings gained with regards to governance and procurement, a second phase of the AIDP could rapidly move to deployment and thereby enable further learnings with regards to post-market surveillance to be developed. • **Data sharing and data standardisation**: it is essential that the NHS breaks down silos between datasets, in order that they be used in sufficient volumes to test and train AI tools to ensure their safety and efficacy. Data is currently fragmented and structured heterogeneously, which prevents large-scale datasets being used for this purpose. A small number of large-scale Secure Data Environments must be developed. • **Information governance processes:** IG processes are likewise highly variable between NHS organisations, and

	moreover are often overly cumbersome. This heterogeneity and complexity creates delays at the implementation stage. Standardised and simplified processes must be crafted and applied at the regional and/or national level if implementation is to be sped up. • **Regulatory infrastructure:** as it is a novel medical technology, it is essential that appropriate frameworks are in place to assess AI tools' safety and performance against expectations. Validation of performance must take place at the initial assessment stage of each AI tool, and then at regular intervals once it is in clinical use. With investment in regulatory bodies such as NICE and MHRA, this work can quickly become routine. • **Workforce capacity:** to secure rapid and safe deployment of AI, the NHS must address persistent workforce shortages amongst both clinical staff and also Digital Data and Technology (DDaT) staff. Amongst the latter group, it is vital that the NHS be able to recruit and retain data scientists, systems architects and software engineers, some of whom should be AI experts. Above all, it is essential that a comprehensive, pathways-level approach to AI implementation is taken. AI tools cannot be introduced in isolation if they are to be maximally beneficial. The effects they will have on the entire patient pathway need to be considered.
Costings	AI will be a crucial component of any strategy to boost NHS productivity. To secure these benefits, a strong, coordinated effort from across government and state bodies, with the necessary financial investment, is necessary. There is a strong case to be made that if AI implementation can be sped up, then return on investment will be secured at an earlier stage. AI deployment projects unavoidably require significant investment of funding and time; but if barriers to deployment that lead to delays can be eliminated, cost savings from integrating AI into routine clinical care will be unlocked more rapidly. Finally, there is a strong case to be made for investment in robust regulatory frameworks and in research of AI's cost-effectiveness. Doing this would reduce the risk of making poor investments in particular AI tools which are not fit for purpose, and thus increase the chances that any funds that are invested are used to deploy AI tools that represent genuine value to patients and to NHS staff.
Impact	Artificial intelligence (AI) tools hold significant promise to improve clinicians' working lives and patient outcomes, by enabling clinicians to focus their care and work to the top of their license. For example, AI

	tools are used at the diagnostic image reporting stage to aid radiologists' decision making could enable more scans to be reported per day. And using AI tools in the radiotherapy planning process could enable faster, more accurate treatments. Together, these would help lead to earlier diagnoses and treatment of diseases like cancer. The earlier cancers are treated, the better the prognosis and the likelihood patients are discharged without long term morbidity, or mortality. This in turn reduces the burden on the NHS, representing a cost efficiency, and would help unlock the wider economic benefits of a healthier population.

12. Community Diagnostic Centre programme

Policy	**£158 million** of further funding should be allocated to **finalise the CDC programme** by establishing hubs in areas with levels of high deprivation, but which as yet are not serviced.
Explanation	The CDC programme was established as a way of expanding NHS England's capacity to deliver diagnostic testing to patients in the face of rising demand – and to do so in a way that makes these services easy to access by locating them in the heart of local communities. By separating elective from acute diagnostics, it is possible to boost efficiency and thus tackle long waits for diagnosis and treatment. The APPG for Diagnostics' report on the performance of the CDC programme found that progress had been mixed.[xiv] Whilst many sites were opened, with new facilities and equipment, there were concerns about the location of CDCs, the pace at which they are taking a greater proportion of all diagnostic testing taking place in NHSE, and in terms of staffing. The report found that further funding is needed to ensure CDC coverage is rolled out across the whole country. Regions like southwest England, the East of England and the English midlands have fewer CDCs than do other regions, in terms of number of CDCs versus population size and metrics of deprivation. In addition, the report found that further financial incentives are required to support ICSs to set up CDCs in community locations. Around 46% of CDCs are currently located on either acute or community hospital sites, some of which are not located in the heart of communities. Case studies of best practice include Wood Green CDC, which is in a shopping centre in central Haringey, the 4th most deprived borough in London.
Costings	Here we estimate the cost of completing the rollout of the CDC programme. • The Richards Review recommended there be 3 CDCs per million population.[xv]

	• The latest UK census reported the English population at 57.1 million.[xvi] • Therefore, minimum coverage should be 171 CDCs. • As of March 2024, 160 CDCs were confirmed as being operational.[xvii] • The 2021 Spending Review committed £2.3 billion to transform diagnostic services. Subsequently, the Health Minister in December 2022 reported that most of these funds were spent to establish the 160 CDCs.[xviii] • Hence further funding is required to establish the remaining 11 CDCs. • Cost per CDC is £2.3 billion / 160 = £14.375 million • Therefore, the cost to finalise the programme is 11 * 14.375 = **£158.125 million**. This calculation assumes an equal spend on each CDC. It also does not account for the proportion of the £2.3 billion not spent on CDCs, though it is suggested, given publicly available information, that this proportion is small. This is likely to be inaccurate, given the diversity of models by which CDCs can be set up.
Impact	CDCs play a central role in achieving the NHS's goal of reducing waiting lists by expanding capacity and moving diagnostics into the heart of local communities. As demand for healthcare is set to increase, CDCs will also enable closer monitoring and management of long-term health conditions. Concentrating diagnostic services in regions of the country with the highest levels of deprivation and lowest levels of healthcare resource will enable the NHS to tackle health inequalities such as life expectancy, quality of life and prevalence of long-term conditions. Completing the CDC programme is therefore essential in enabling the NHS to achieve these aims.

Building system capacity

13. The sheer scale of the increased demand the NHS will soon face creates an inescapable need to invest in its capacity. This means that further funding will be required to expand the NHS estate and its capital. There are also enormous opportunities to update existing capital to bring the NHS into the twenty-first century and set it on a sustainable footing for its next 75 years.

14. Radiotherapy equipment:

Policy	Invest **£110.8 million** to **replace the 64 linear accelerator machines in NHS England that are over 10 years of age**, to support the delivery of highly effective radiotherapy treatments to cancer patients.
Explanation	Radiotherapy is a highly effective curative and palliative cancer treatment which uses radiation to shrink or destroy cancer cells in the

	body. Whilst it uses few consumables (such as drugs), it relies on complex equipment and infrastructure. Linear accelerators (linacs) are units which deliver high-energy X-rays to the tumour. Many of NHS England's linac machines are over 10 years old, which is their standard recommended equipment lifespan. These machines are slower and deliver greater radiation doses than their modern equivalents, and so need to be replaced. There is also some concern that the NHS does not have enough linacs and other machines to meet rising demand for radiotherapy. International comparisons show that the UK has fewer linacs than comparator countries; one study showed that the UK had 314 linacs, versus 450 in Germany and 449 in France.[xix] We here make the case for investment in that part of the radiotherapy service in the form of replacing those linac machines aged 10+ years.
Costings	The ESTRO-HERO report provides data with which to estimate the cost of replacing England's ageing supply of linacs (using 2017 data).[xx] • There are 64 linacs aged 10+ years in the NHS in England, the point at which replacement is recommended (~19% of the total of 336 linacs). • The unit cost of a linac is £1.731 million. • Thus, giving a total cost of **£110.8 million** to replace these obsolete units. This analysis does not include: • Linac maintenance costs, estimated at between £138k to £260k per year per unit • The purchase and maintenance costs of CT/MRI scanners, used in the radiotherapy planning process prior to radiation delivery • Discounts obtained by bulk purchasing (as have been demonstrated in the past)[xxi] • The cost of upgrading underlying IT infrastructure, which can be disjointed, outdated and slow, and which results in millions of hours of lost time for clinicians.[xxii]
Impact	In England in 2022-23, over 142,000 courses of radiotherapy were delivered to patients.[xxiii] Furthermore, it is estimated that 40-50% of cancer patients in the UK will require some radiotherapy during the course of their treatment, despite observed utilisation rates in NHS England being below this, at 25-38%.[xx] Replacing these linacs with modern equivalents would boost NHS productivity by enabling faster and more effective radiotherapy treatment and better patient outcomes.

15. Interventional radiology services

Policy	The NHS must **invest in interventional radiology services** to empower IR clinicians to deliver highly effective treatment at lower costs to both patients' health and to NHS finances.
Explanation	Interventional radiology services are an essential component of modern healthcare. Image-guided surgery can enable patients to be treated more quickly, effectively and with fewer adverse effects than traditional approaches. Mechanical thrombectomy (MT) for stroke patients is particularly transformative. If performed in sufficient time, it can enable patients to retain a high quality of life and, in some instances, leave the hospital on the same day as their treatment, thereby freeing up NHS beds for other patients. However, IR services face significant challenges that limit their ability to provide life-saving care. Foremost amongst these is the lack of access to day case and inpatient beds. One in four (26%) of IR teams have no access to either inpatient or day case beds.[iv] This means they cannot perform IR procedures, and patients may suffer as a result. IR services also struggle to train new consultants. IR is a practical discipline, so sufficient access to IR sessions is essential for training. 91% of IR services struggle to train junior staff because they lack the physical space, 79% report a lack of staff time to deliver training, and 82% report a lack of funding.[iv] The NHS needs the resources to expand facilities such that IR services have adequate access. Work with local NHS leaders is needed to negotiate fair access to beds and equipment by different specialties in the interests of patients. IR services are also not accessible to many patients. Over half (52%) of trusts in 2023 operated an inadequate IR service, meaning they either lacked a 24/7 IR rota, or had a rota of less than 1:6 IR consultants, or did not have formal networked arrangements for the transfer of patients for IR procedures.[iv] This means patients either do not receive IR treatment, including lifesaving MT in the case of stroke victims, or else their treatment is delayed, affecting its efficacy. Finally, NHSE datasets are poorly coded when it comes to IR, meaning that they do not adequately capture how many IR procedures are conducted and patient outcomes following these procedures. Such data is essential to improve the service and to evidence the need for its expansion.
Costings	Studies have demonstrated the clinical- and cost-effectiveness of IR services. Percutaneous endovascular aortic repair (IR surgery) outperforms EAR with open femoral exposure (traditional surgery). Moving to an IR approach reduces operating theatre time by 19%, reduces length of hospital stay by 50% and reduces overall cost by 23%.[xxiv] For context, overnight hospital stay costs £400 on a ward and £1,150 in a critical care unit per patient per night.[xxv]

	Therefore, investing in IR services has huge potential to enable the NHS to deliver high quality care at a lower cost. Investing in IR services would rapidly be repaid in terms of revenue generated to individual NHS trusts (via the tariff scheme) and in terms of the economic benefits to the country of a healthier population spending less time in hospital and avoiding long-term morbidity.
Impact	Boosting the productivity of IR services would reap significant rewards in terms of patient wellbeing and in cost effectiveness of delivering healthcare. This would enable patients to access life-saving care more quickly and thus recover more quickly, freeing up hospital beds and increasing the NHS's resource use efficiency. Stroke care would be transformed. The RCR believes that with these interventions, it is possible to ensure that **all neuroscience centres** are able to provide **mechanical thrombectomy 24/7**, and that the NHS could achieve its goal of treating **at least 10% of direct admissions** for stroke with MT.

Conclusions

16. The recommendations and bids made in this paper represent smart investments in the future of the NHS. They would have significant and long-term benefits to the NHS, its staff, and the patients it serves. Importantly, they would have these benefits at a time when the NHS is under significant strain and when we know that demand for healthcare is projected to rise hugely in the coming decades. The investments argued for in this paper would improve the productivity of diagnostics and cancer care services by supporting staff to work effectively and at pace – and thus enable the NHS to meet the challenges of the 21st century. We would be happy to discuss the content of this paper in more detail and to answer any questions you may have.

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