Understanding the impacts of investing in training for clinical radiology and clinical oncology

A WPI Economics report for the Royal College of Radiologists

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EXECUTIVE SUMMARY

There is a significant shortfall in the numbers of clinical radiologists and clinical oncologists in the UK:

- To meet existing and growing demand, it is estimated that there is a shortfall of 1,939 whole-time equivalent (WTE) consultant clinical radiologists across the UK (a 33% shortfall). For clinical oncology, this figure stands at 189 WTE consultants (a 19% shortfall).
- If trends in demand and workforce entries and exits continued to 2030, there would be shortages of close to 6,000 consultant clinical radiologists and 700 consultant clinical oncologists.

These shortfalls are costing lives and costing the NHS money (through the need to outsource work and recruit from overseas, as well as facing increased treatment costs for patients diagnosed late), which would be better spent elsewhere, improving patient outcomes.

- Even before the pandemic, 10% of people waited more than 6 weeks for an MRI. In December 2020, this stood at 21%.[1]
- Staff shortages have been identified as a key driver of the fact that 115,000 cancer patients in England are "diagnosed too late to give them the best chance of survival".[2]
- Even a four-week delay in cancer treatment can lead to increased risk of death by 6-13%.[3]
- More than half of participants (57%) are worried that delays to their treatment could affect their chance of survival.[4]
- The costs of outsourcing in radiology alone stood at £206 million in 2020.
- Absence, turnover and presenteeism associated with poor mental health from stress, burnout and pressure is estimated to be costing the NHS close to £10 million a year across the clinical radiologist and clinical oncologist workforces.[5]

Tackling this shortage is necessary to ensuring that patient outcomes do not continue to suffer. Doing it in a sustainable way will mean that we do not continue to place excessive pressure on an already overstretched workforce, meaning that productivity, retention and experience will also rise.

A range of different approaches can contribute to reducing the shortage. However, this report shows that even if overseas recruitment were increased by 50%, outsourcing doubled (for clinical radiologists) and improved working practices led to very significant efficiency gains, just 56% (clinical radiologists) and 18% (clinical oncologists) of the WTE shortfall would be met by 2030. It is also clear that none of these strategies are feasible and sustainable without a significant increase in training numbers.

This report shows the potential impacts of an increase of 130 clinical radiologist training starts per year and 50 clinical oncologist training starts per year in England. It shows that:

Over a five-year horizon, each extra year of investment in training:

- Costs £69 million in additional training and salaries.
- Saves £30 million compared to delivering the increase in WTEs through increased outsourcing and overseas recruitment.

Over a ten-year horizon, each extra year of investment in training:

- Costs £152 million in additional training and salaries.
- Saves £190 million compared to delivering the increase in WTEs through increased outsourcing and overseas recruitment.

Table 1 shows the impacts of this increase in investment being made permanent. In summary:

- By 2025, compared to current trends the strategy would deliver:
    - An increase of 112 WTE clinical radiologists (up to 5% of the required increase); and
    - An increase of 53 WTE clinical oncologists (up to 23% of the required increase).
- By 2030, compared to current trends the strategy would deliver:
    - An increase of 539 WTE clinical radiologists (up to 45% of the required increase); and
    - An increase of 200 WTE clinical oncologists (up to 95% of the required increase).
- Compared to an alternate approach of increasing overseas recruitment and outsourcing, the combined strategy would deliver this WTE increase with cost savings of £420 million by 2030.
- The approach would also be sustainable. With pressures already on overseas recruitment and outsourcing, it is unlikely that these routes could feasibly deliver such a large increase in WTE workforce.

Table 1: Cumulative impacts of training strategy for clinical radiologists and clinical oncologists

	Clinical Radiologists	Clinical Oncologists
Additional training starts by 2025	520	200
Additional training starts by 2030	1170	450
Additional WTEs by 2025	112	53
Additional WTEs by 2030	539	200
Total training costs by 2025 (£millions)	£102	£39
Total training costs by 2030 (£millions)	£359	£149
Additional salaries for WTEs by 2025 (£millions)	£0	£0
Additional salaries for WTEs by 2030 (£millions)	£120	£27
Total savings compared to alternative strategy by 2025 (£millions) (positive = savings)	-£30	
Total savings compared to alternative strategy by 2030 (£millions) (positive = savings)	£420	
Total savings compared to alternative strategy over five years (£millions) (positive = savings)	-£10	
Total savings compared to alternative strategy over 10 years (£millions) (positive = savings)	£610	

Source: WPI Economics

INTRODUCTION

Demand for cancer services has never been higher. 1 in 2 people in the UK born after 1960 will have cancer at some point during their lifetime.[6] Radiotherapy in particular is one of the most effective treatments for some cancers. Around 40% of patients who are cured from their cancer receive radiotherapy as part of their treatment.[7] Clinical radiologists play a vital role in the diagnosis of stroke, trauma and deep vein thrombosis as well as cancer. Clinical oncologists (CO) play a critical role in managing the care of cancer patients as well as leading multidisciplinary teams, delivering non-surgical cancer treatment and training the future workforce.[8]

The NHS *Long Term Plan* has set ambitious targets on the treatment and diagnosis of cancer with a goal that by 2028, an extra 55,000 people each year will survive for five years or more following their cancer diagnosis.[9] Currently, workforce census data shows a significant gap in supply and available resources. The Covid-19 pandemic has only exacerbated problems, delaying cancer diagnosis, contributing to staff shortages and further stretching the existing workforce. These factors not only jeopardise the *Long Term Plan* but also the mental and physical wellbeing of NHS staff. Investing in training places for clinical radiologists and clinical oncologists today will help to prevent unnecessary deaths in the future.

This report outlines the existing scale of shortages in the workforce and identifies the main costs that these shortages create. It then explores different ways in which the gap between supply and demand could be filled. It shows that recruitment from abroad and improved working practices (e.g. the introduction of AI and an improved skills mix) will not get close to meeting needs. As such, it confirms the importance of a sustainable and long-term increase in training numbers in England and shows that overall, compared to other strategies, this would lead to direct cost savings for the NHS. The report does not seek to estimate the wider benefits including improved patient outcomes, but these would also be significant.

THE SCALE OF WORKFORCE SHORTAGES

Across clinical radiology, interventional radiology and clinical oncology, there are huge shortages in capacity which already lead to worse outcomes for patients, contribute to burnout across the professions and cost the NHS money.

Now

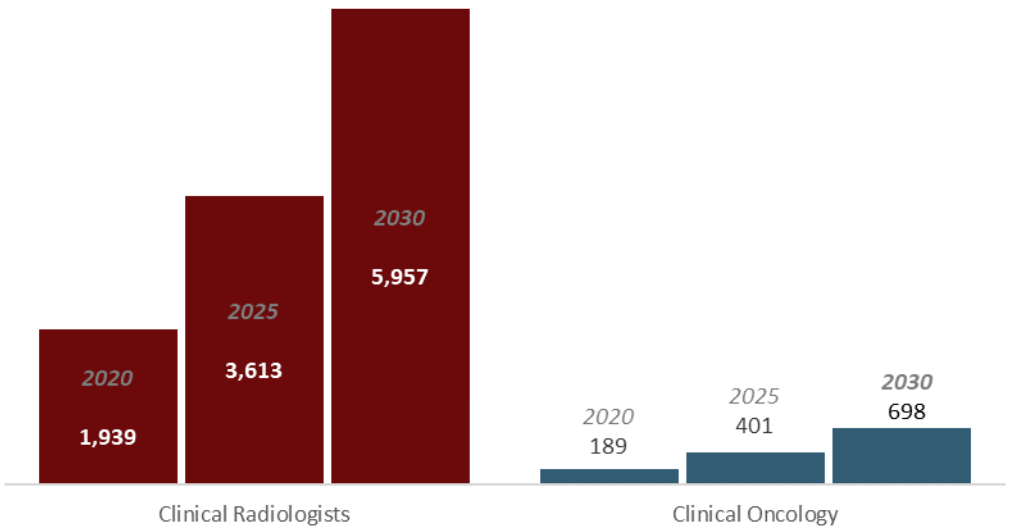
There were a high number of vacancies across the system in 2020: 87 consultant-grade vacancies in cancer centres across the UK and 433 consultant clinical radiologist vacancies across UK hospitals. In each, well over two-thirds of vacancies remain unfilled for more than a year.

But this is just the tip of iceberg as it ignores the need to increase capacity to meet existing and growing demand. In total, it is estimated that there is a shortfall of 1,939 whole-time equivalent (WTE) consultant clinical radiologists across the UK (a 33% shortfall). For clinical oncology, this figure stands at 189 WTE consultants (a 19% shortfall).

In future

Currently staffing numbers are not growing in proportion to patients' needs. Even before the pandemic and the resulting increase in demand from delays and increased morbidity, a range of pressures were increasing demand and changes in the workforce are just not keeping up. By 2025, it is estimated that there will be a shortfall of 3,613 WTE consultant clinical radiologists and 401 WTE consultant clinical oncologists. If these trends continued to 2030, there would be shortages of close to 6,000 consultant radiologists and 700 consultant-grade clinical oncologists.

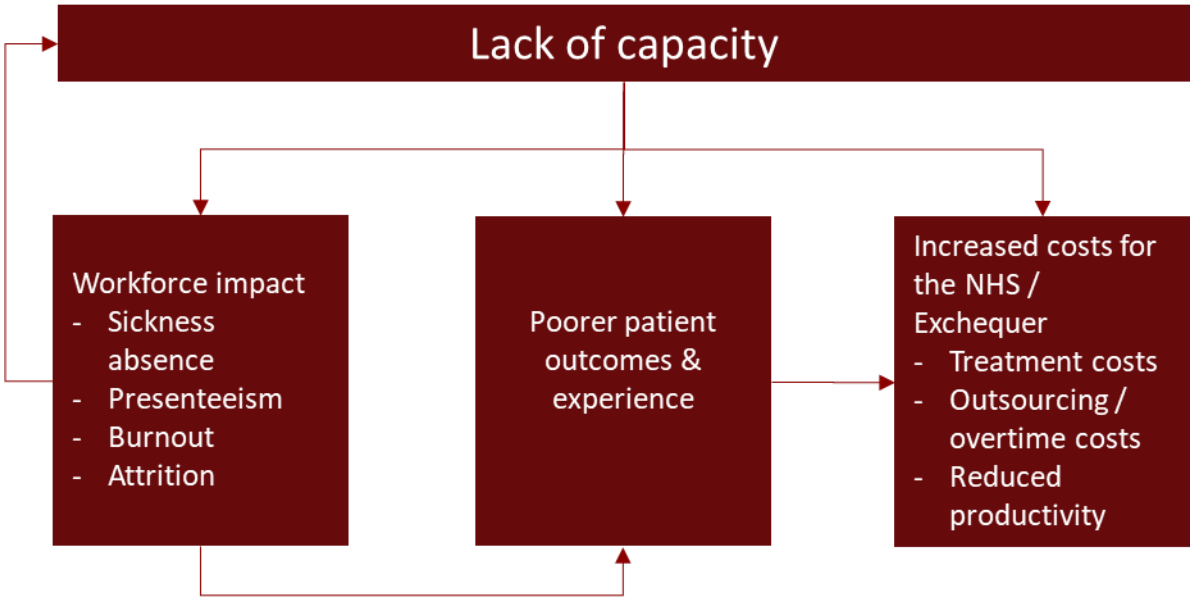
Figure 1: Workforce shortages now and in the future, consultant radiologists and consultant clinical oncologists (WTEs)



Source: Royal College of Radiologists and WPI Economics' calculations

THE IMPACT OF WORKFORCE SHORTAGES

Workforce shortages amongst clinical radiologists and clinical oncologists come with a wide range of potential impacts. These come through poorer outcomes for patients, through the direct and indirect effects of stress, burnout and presenteeism and through increased inefficiency and costs for the NHS.



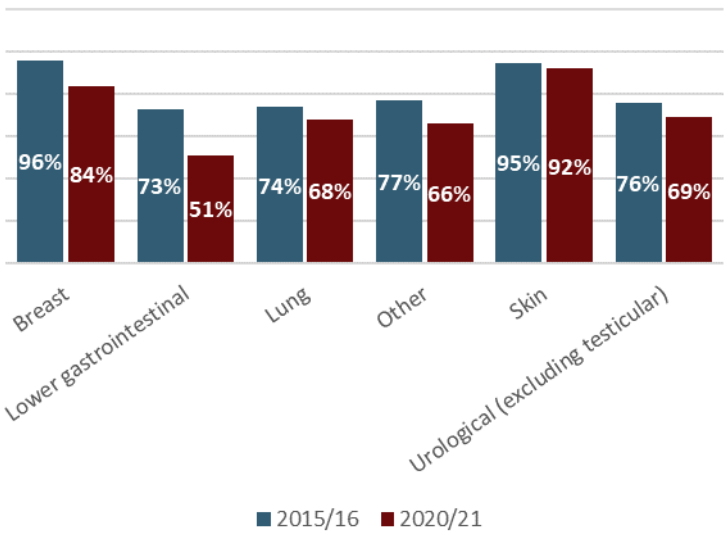
Source: WPI Economics

Waiting times

The most apparent symptom of shortages is delays in accessing treatment and missed opportunities for early diagnoses, especially of cancer.

Unsurprisingly, the Covid-19 pandemic has made this situation worse. For example, the number of people waiting over six weeks for an endoscopy in August 2020 was nine times higher than in August 2019.[10] The proportion of people waiting for more than six weeks for an MRI was 21% in December 2020 compared to 10% in March 2020. Waiting times for treatment following diagnosis have also increased (Figure 2). Alongside an already stretched system, this presents a significant challenge.

Figure 2: Percentage of patients treated within 62 days



Source: NHSE

Poorer patient outcomes

Delays accessing diagnosis and treatment lead to poorer health outcomes. Over half of cancer service leaders report that workforce shortages have negatively impacted on patient care. Delays also increase anxiety amongst patients. More than half of participants (57%) are worried that delays to their treatment could affect their chance of survival. Of those cancer patients that had their treatment delayed or cancelled due to the pandemic, 41% were stressed, anxious or depressed, demonstrating the harmful effects on mental wellbeing.[11]

- Staff shortages have been identified as a key driver of the fact that 115,000 cancer patients in England are "diagnosed too late to give them the best chance of survival".[12]
- Even a four-week delay in cancer treatment can lead to increased risk of death by 6-13%.[13]
- A 6-month delay in treatment has been associated with an estimated 21.3% increase in tumour volume and a 6% increased likelihood that this will spread from the original site.[14]
- NAO report suggests 25% of delays to cancer treatments are due to lack of capacity.[15]

Workforce Impact

Clinical radiologists and clinical oncologists are at significant risk of burnout, stress and poor mental health. Each of these are correlated with job dissatisfaction, the intention to leave as well as sickness absences and presenteeism. In turn, this has the impact of making shortages worse.

These issues have been exacerbated by the pandemic which has resulted in many consultants planning to reduce their hours or leave the NHS altogether.[16]

- In 2018, only 2% of departments were able to meet reporting requirements in consultant radiologists contracted hours, resulting in overtime and an excessive workload.[17]
- Excessive workload is predicted to contribute to an annual attrition rate of 1.1% (excluding retirement) amongst clinical radiologists feeling stressed and overwhelmed to keep up with demands.[18]
- In 2020, two in five full time clinical oncology consultants had job plans including 12 or more programmed activities (equivalent to working at least 48 hours before overtime). Therefore, many CO consultants are likely to work in excess of 50 hours per week on a regular basis.[19]

Increased costs for the NHS / Exchequer

There are a wide range of potential costs associated with a lack of capacity. These come directly from the need to outsource work to keep up with demand as well as indirectly through increased costs of treatment for patients who are forced to wait and may have diagnoses delayed.

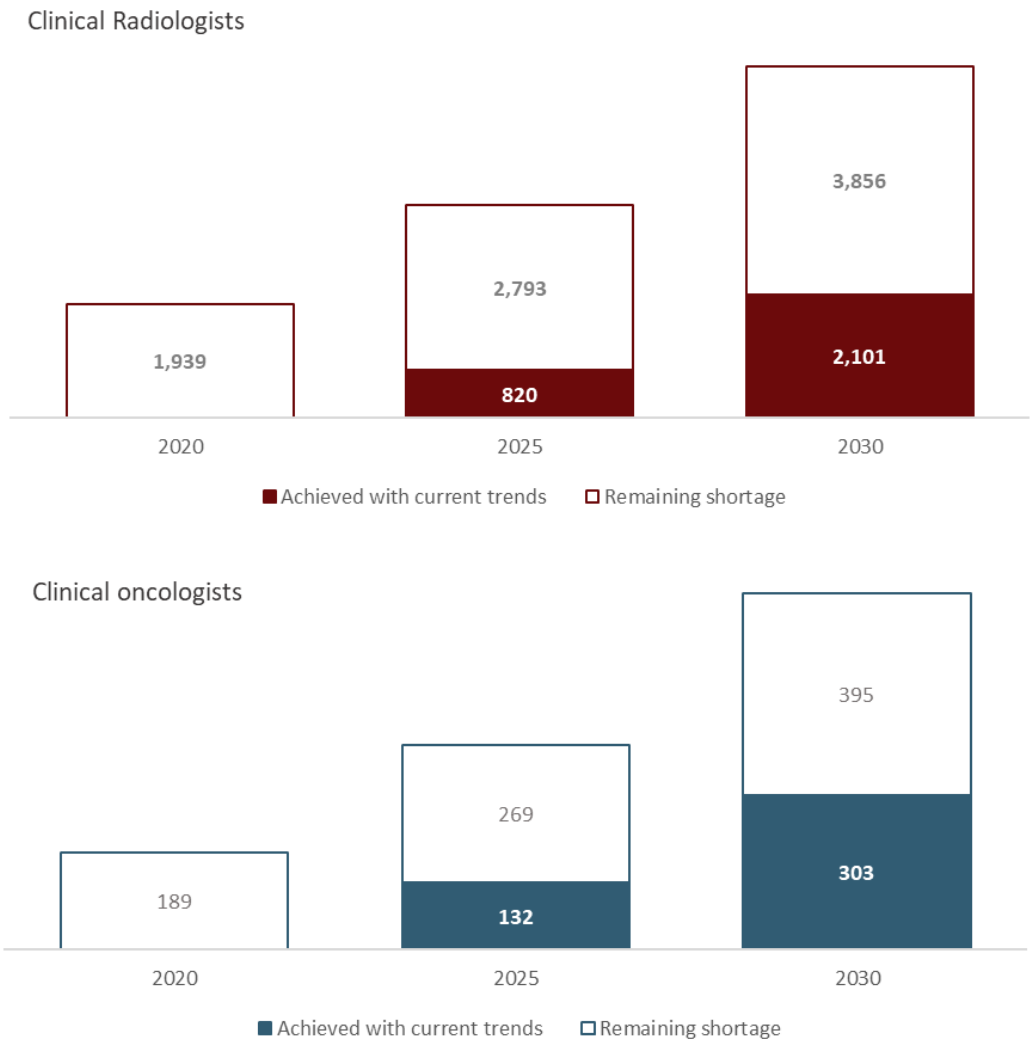
- Over recent years, there has been an increase in the volume of outsourced and insourced reporting by clinical radiologists. Finance has been spent on outsourcing to teleradiology companies, overtime pay to contracted clinical radiologists and payments for ad-hoc locums to clear reporting backlogs. In 2015, 75% of departments reported that they outsourced some of their reporting work to commercial companies and 92% made overtime payments to clinical radiologists.[20] Furthermore, £206 million was spent on outsourced and insourced radiology reporting and ad-hoc locums in 2020.[21] This current system creates financial inefficiencies in the system and is only effective in the short-term.
- A range of evidence suggests that treatment for cancer patients who are diagnosed early are 2 to 4 times less expensive compared to treating people diagnosed with cancer at more advanced stages.[22]
- For example, the mean treatment costs of breast cancer at Stage II, III and IV are estimated to be 32%, 95%, and 109% higher than at Stage I.[23]
- The excess deaths predicted from the fallout of the pandemic will also contribute to wider economic costs. One paper predicts that the delays in diagnostic delay in breast, colorectal, lung and oesophageal cancer will translate into productivity losses of £104 million over five years.[24] When other tumour types are considered, this demonstrates the urgent need to tackle the cancer backlog.
- Absence, presenteeism and turnover associated with poor mental health amongst consultant clinical oncologists and radiologists are estimated to be costing the NHS close to £10 million every year.[25]

HOW CAN THIS BE FIXED?

One thing that is clear is that there should not be a question of whether this needs to be fixed. Current shortages in the workforce are costing lives and wasting NHS money that would be better invested in tackling the problem and improving patient outcomes. These problems are only going to get worse in future if supply continues to lag demand. In short, the current situation is unsustainable.

The investment in training places made in 2021 will go some way towards meeting growing demand and increasing the numbers of WTE practicing clinical radiologists and clinical oncologists. Figure 3 shows the additional increases in WTE practicing clinical radiologists and clinical oncologists that would be needed to meet demand, after accounting for the increase in 2021, and assuming that yearly training starts return to typical levels in future years.

Figure 3: Workforce shortages (WTE) after accounting for existing and planned training investment



Source: WPI Economics

Notes: These charts and analysis that follow account for those in training contributing to meeting the workforce shortfall. See assumptions in annex for more detail.

However, this still leaves a significant shortage. There are a number of viable solutions to tackling these. Many of these are already used to some extent or have been the subject of debate. For example, by increasing outsourcing and recruitment from abroad and improving working practices (e.g. through introduction of Artificial Intelligence (AI) and improved skills mix).

There are two problems with this. First the scale of the change needed and, second, the costs. Figures 4 and 5 show that even if overseas recruitment were increased by 50% and the current scale of outsourcing in radiology were doubled there would still be a significant shortage compared to the required increase in consultants needed. For example, the increase in the number of clinical radiologists would be just 18% of that needed in 2025. For clinical oncologists, the increase would be 8% of that required in 2025.

The charts also show the potential implications of improved working practices, for example the introduction / rollout of more extensive use of Artificial Intelligence and improving the skills mix. Here, even if improved working practices led to efficiency savings which meant that fewer new WTEs were needed, there would still be a significant shortfall.

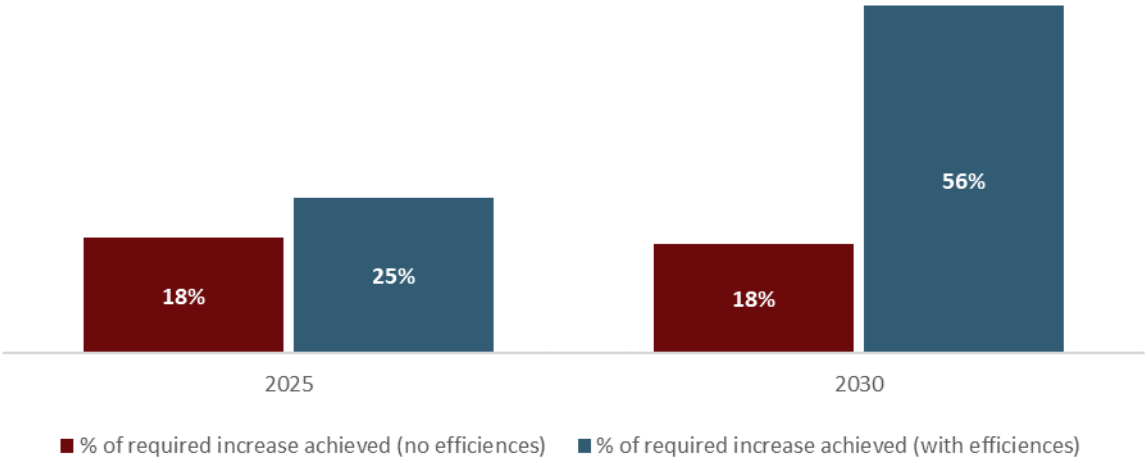
For example, even with these efficiency gains, doubling outsourcing and increasing overseas recruitment by 50% would only deliver just over half of the required increase in WTE clinical radiologists and just 18% of the required increase in WTE clinical oncologists. This is remarkable given the scale of the efficiencies being assumed. For example, the efficiencies assumed for clinical radiology are equivalent to delivering productivity gains that mean halving the number of radiologists required. For clinical oncology, the efficiency gains would reduce the needed increase in WTEs by nearly a third.

The costs of this approach would also be significant, reaching nearly £300 million per year by 2030.

Table 2: Efficiency savings assumed in scenarios (efficiency = % reduction in increase in WTEs needed to meet demand)

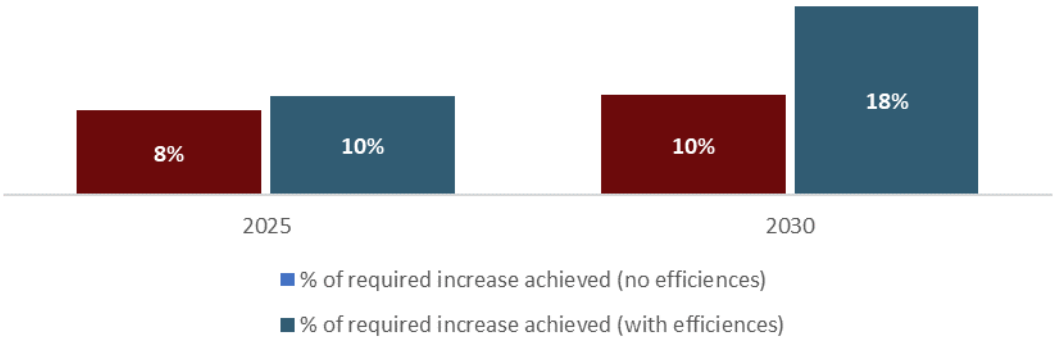
	Clinical Radiologists	Clinical Oncologists
By 2025	20%	10%
By 2030	50%	30%

Figure 4: Proportion of required increase in WTE clinical radiologists achieved by increasing overseas recruitment by 50% and doubling the existing level of outsourcing



Source: WPI Economics calculations

Figure 5: Proportion of required increase in WTE clinical oncologists achieved by increasing overseas recruitment by 50%



Source: WPI Economics calculations

Aside from the practical constraints of the scale of change needed, and the associated costs, it is also clear that each of these options is only viable alongside a thriving and effective workforce. AI in particular will only be successful if it is used in conjunction with professionals who can assess history and evaluate results, and will increase the workload on the workforce to roll-out new innovations. Otherwise, it risks posing additional costs that outweigh benefits to patients and health systems.[26]

This suggests that, alongside other viable options, a sustainable and cost-effective increase in capacity must be partly delivered through investment in new trainees. We also know that trainees make a significant contribution to the institution's service needs (particularly in the later years of training).

To understand the potential benefits of a strategy that focuses on investment in trainees, the rest of this report models the potential workforce impacts of making a permanent increase in trainee places in England of 130 for clinical radiologists (with 20 specialising in IR) and 50 for clinical oncologists. It then compares the costs of that investment against an alternative strategy to delivering the same increase in WTEs through increased recruitment from abroad and outsourcing (for clinical radiologists).

Table 3: Increase in training starts modelled in this report

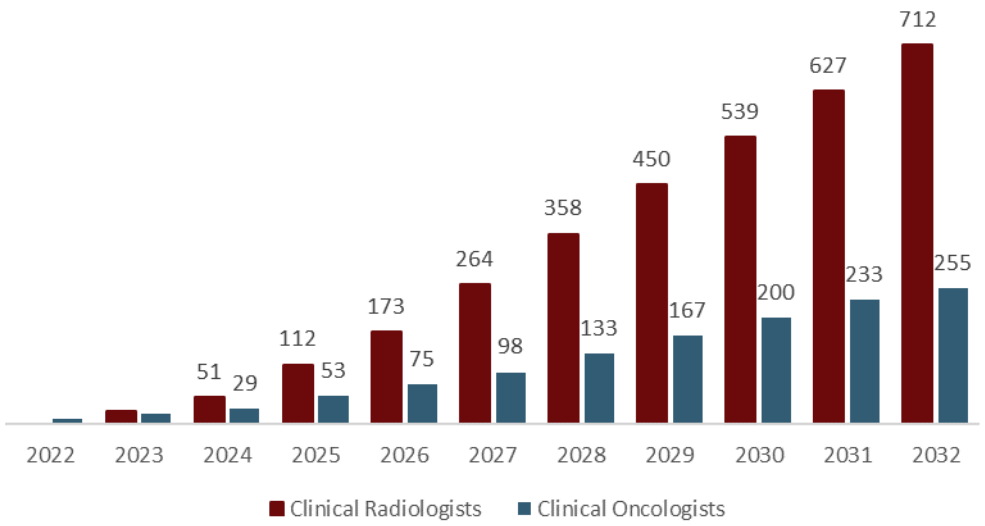
	Clinical Radiologists	Clinical Radiologists (IR)	Clinical Oncologists
Baseline training starts per year	246	54	65
Increase in training starts per year from 2022	110	20	50

INVESTING IN TRAINING

Increase in WTEs

Figure 6 demonstrates the net increase in WTEs (compared to existing planned investment and an assumption that trainee starts return to typical levels in 2022) a continued investment in training places would deliver over the next 10 years.

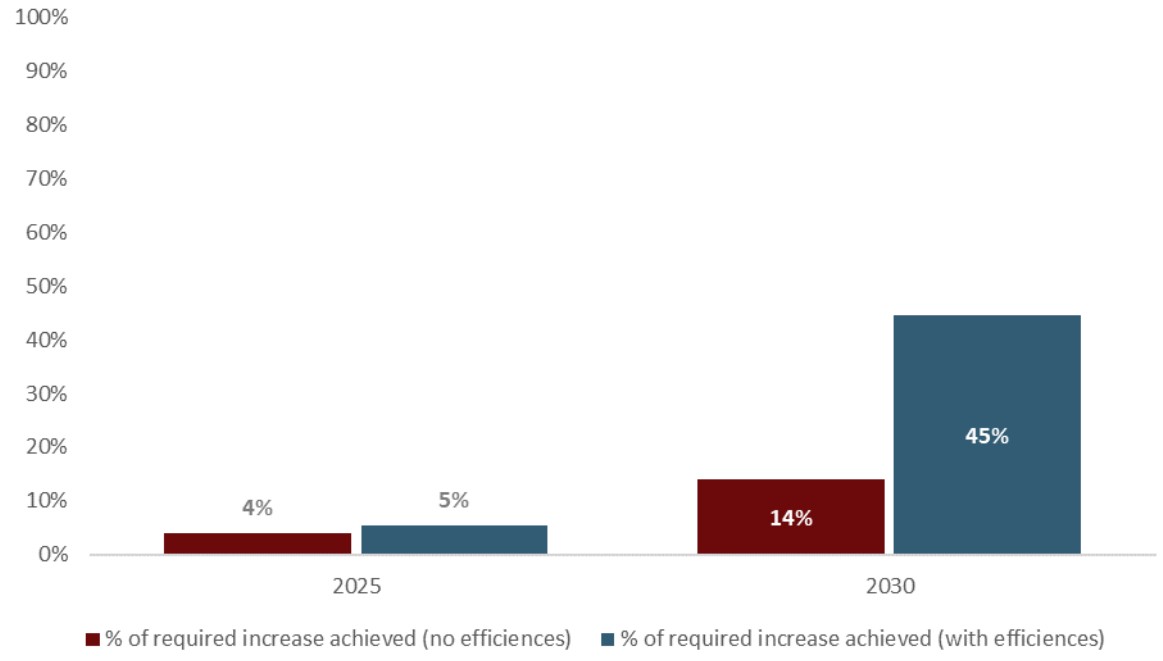
Figure 6: Increase in WTE clinical radiologists and clinical oncologists achieved through an investment in training places



Source: WPI Economics

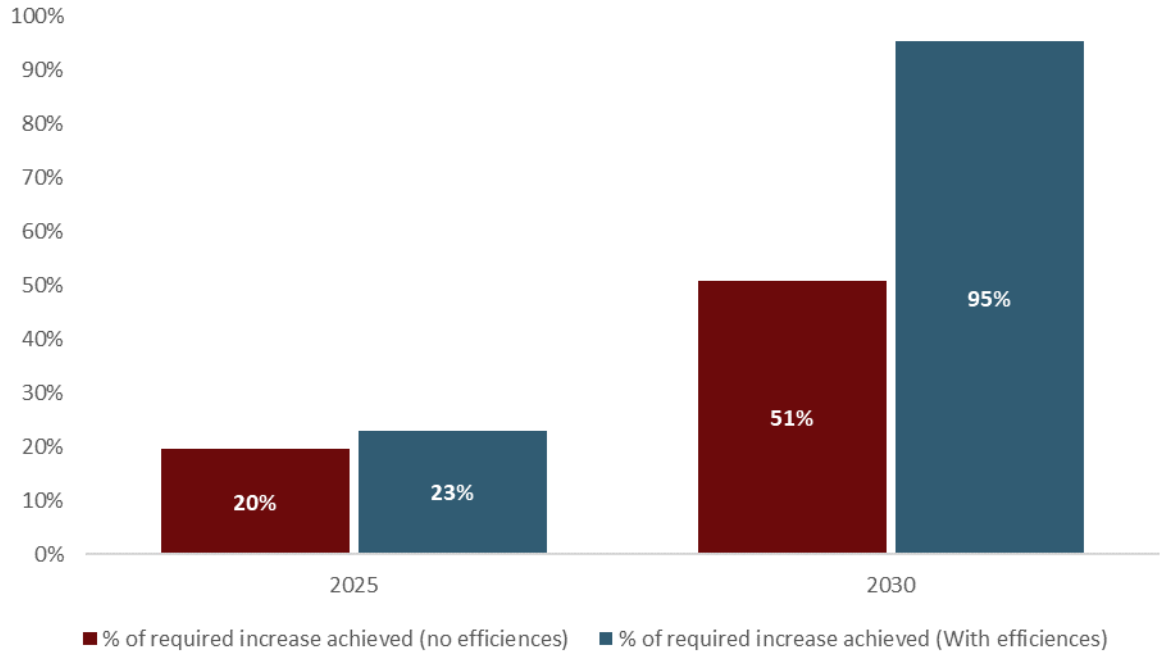
The figures (7 & 8) below show how this compares to the overall increase in WTEs needed. By 2030, a permanent increase in training for clinical radiologists could deliver an increase in WTEs equivalent to up to 45% of that needed (assuming efficiencies are also delivered). For clinical oncology, the investment could lead to achieving up to 95% of increased WTEs needed by 2030.

Figure 7: Proportion of required increase in WTE clinical radiologists achieved through an investment in training



Source: WPI Economics

Figure 8: Proportion of required increase in WTE clinical oncologists achieved through an investment in training

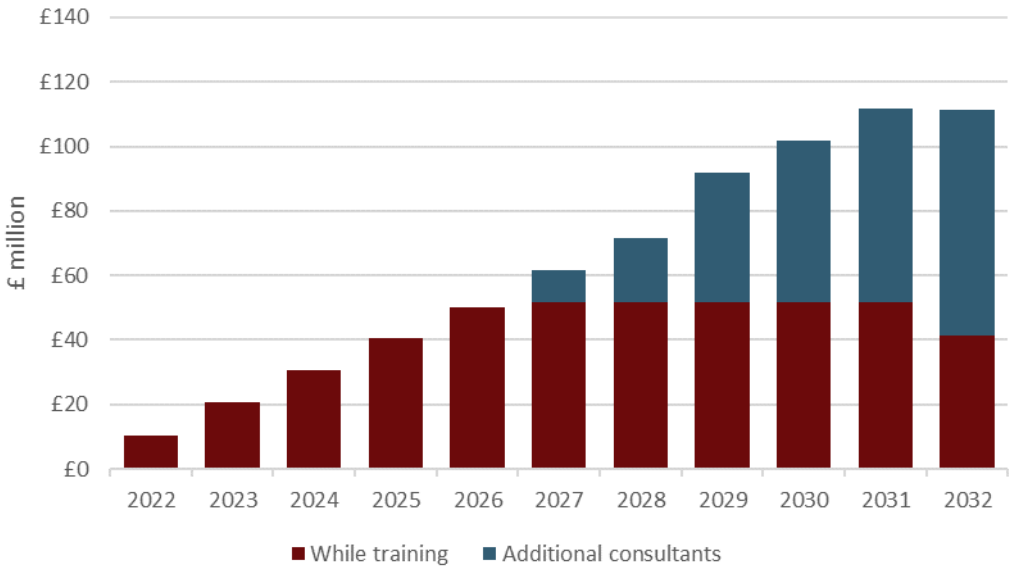


Source: WPI Economics

Increase in costs

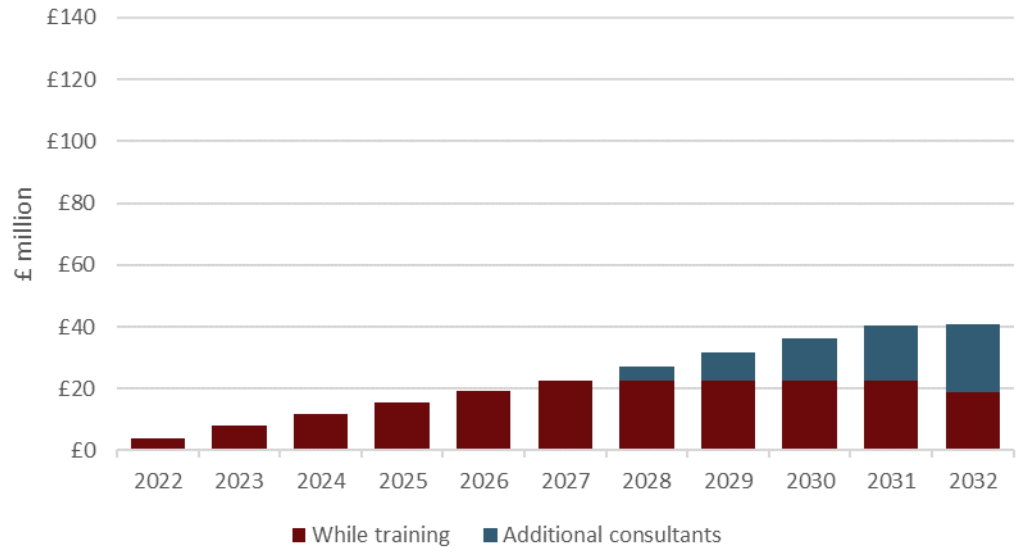
Figures 9 and 10 below demonstrate the total costs of the training strategy over a 10-year horizon. These are split between the costs of the training itself, and the salary costs of those who complete training and continue to practice as consultants.

Figure 9: Costs of training and subsequent salaries of qualified consultants – increase of 130 starts a year in clinical radiology



Source: WPI Economics

Figure 10: Costs of training and subsequent salaries of qualified consultants – increase of 50 starts a year in clinical oncology



Source: WPI Economics

Increase in costs compared to alternative strategies

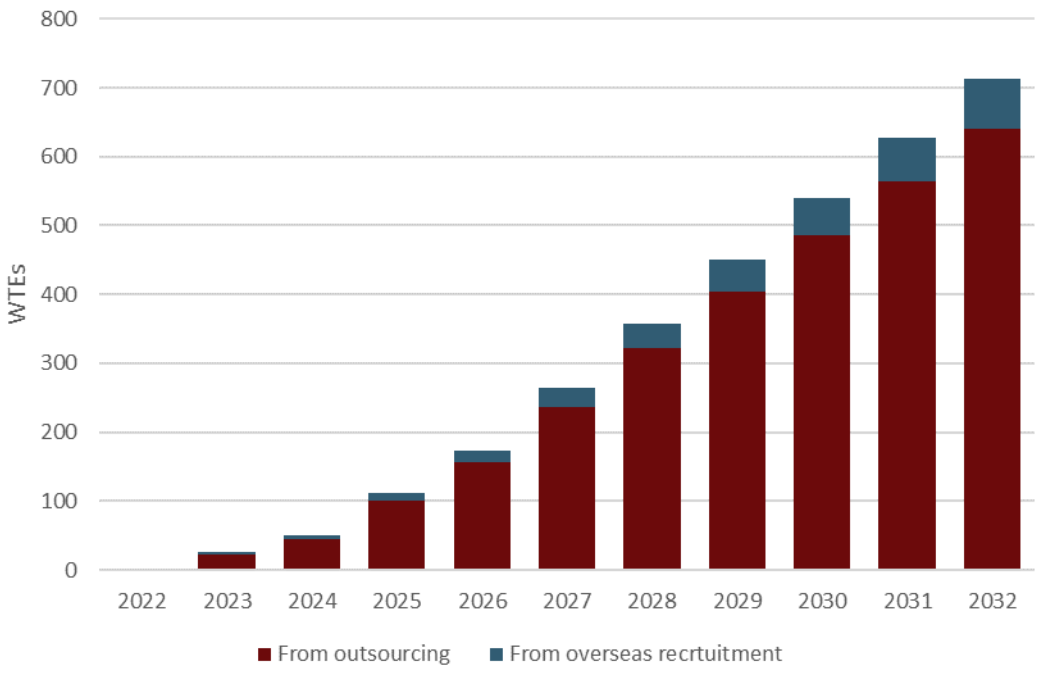
Given the imperative to tackle this shortage amongst the clinical radiologist and clinical oncologist workforce, these estimates of costs need to be compared to alternative strategies which could deliver the same scale of increase in WTEs. To do this we have estimated the potential costs that would be associated with creating the same increase in WTEs through a combination of increased recruitment from abroad and increased outsourcing.

Table 4: Alternative strategy for meeting increase in WTEs that would be created through investment in training

	Clinical Radiologists	Clinical oncologists
From increased overseas recruitment	20%	100%
From increase in outsourcing	80%	-

Figures 11 and 12 show what these means for the split of increased outsourcing and increased overseas recruitment to meet the increase in WTEs.

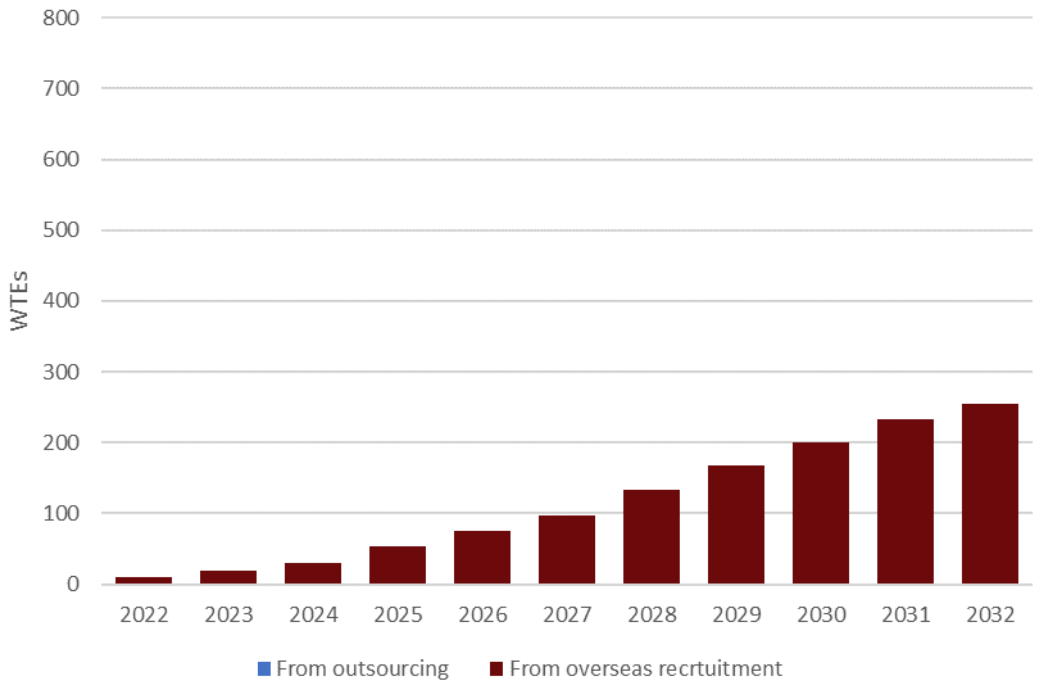
Figure 11: Approach to meeting equivalent increase in WTE clinical radiologists through alternate strategy of overseas recruitment and outsourcing



Source: WPI Economics

For clinical oncologists, figure 14 shows that the costs of the training strategy are slightly higher than the equivalent costs of direct recruitment from abroad, with yearly costs between £3 million and £8 million per year higher for most of the period. However, in practice, there is a question over the extent to which overseas recruitment could actually deliver the required WTEs. If this were a viable route, more cancer centres would already be tapping further into this market to fill long-term vacancies, which is not the case. Existing challenges including visa processes, political uncertainty and English language requirements, alongside growing challenges of lockdowns and travel restrictions related to Covid-19, all mean that a significant increase in overseas recruitment is unlikely to be feasible. As such, the costs of attempting this alternate strategy would likely be seen in continued shortages, increased waiting times and poorer patient outcomes.

Figure 12: Approach to meeting equivalent increase in WTE clinical oncologists through alternate strategy of overseas recruitment

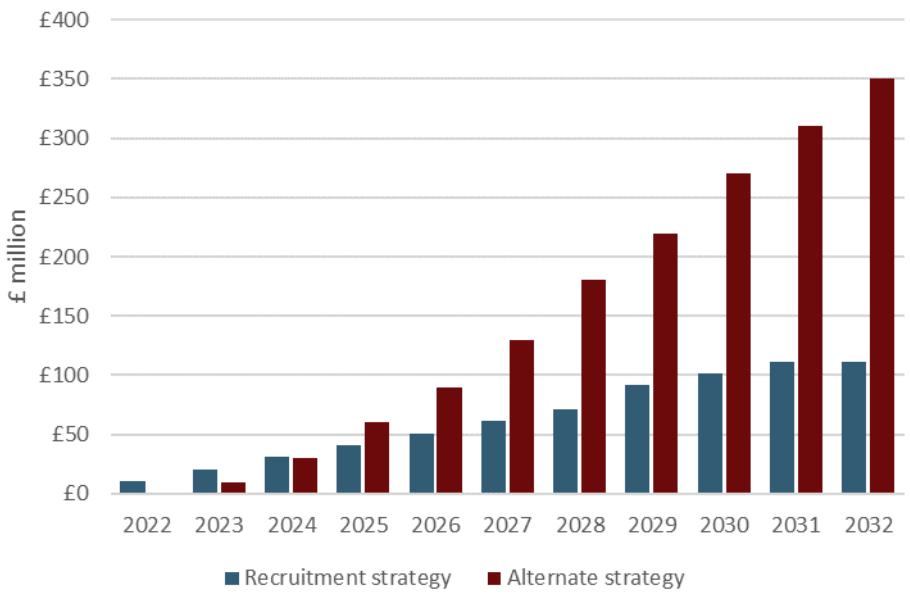


Source: WPI Economics

Comparing the costs of the training strategy with the alternate strategy allows us to assess which is cheaper for delivering an equivalent WTE increase.

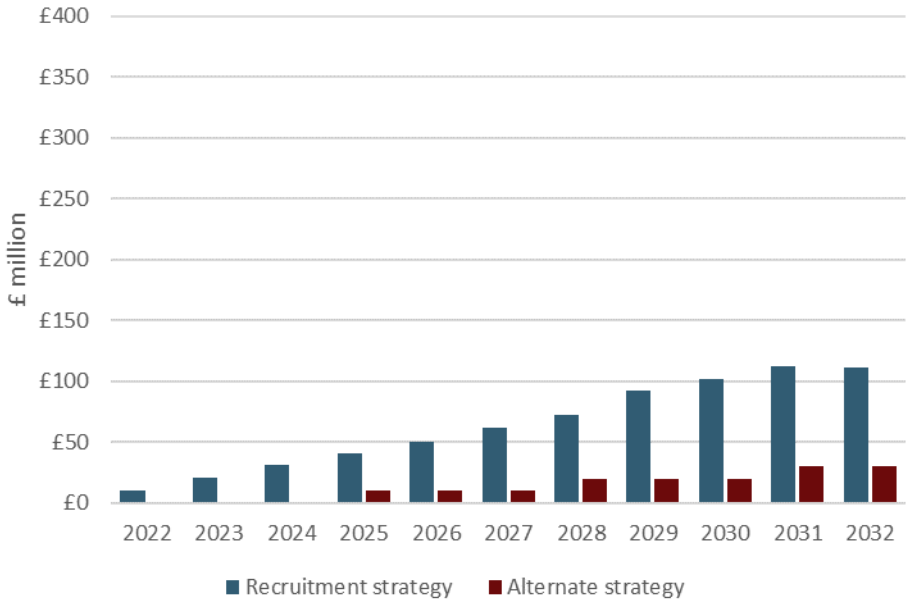
Figure 13 shows that the training strategy is significantly better value for money for increasing WTE radiologists, with very small initial outlays in the early years of the strategy, followed by significant savings (of £100 million per year or more) from 2026.

Figure 13: Costs of clinical radiologists training strategy compared to alternative strategy to deliver the same increase in WTEs



Source: WPI Economics

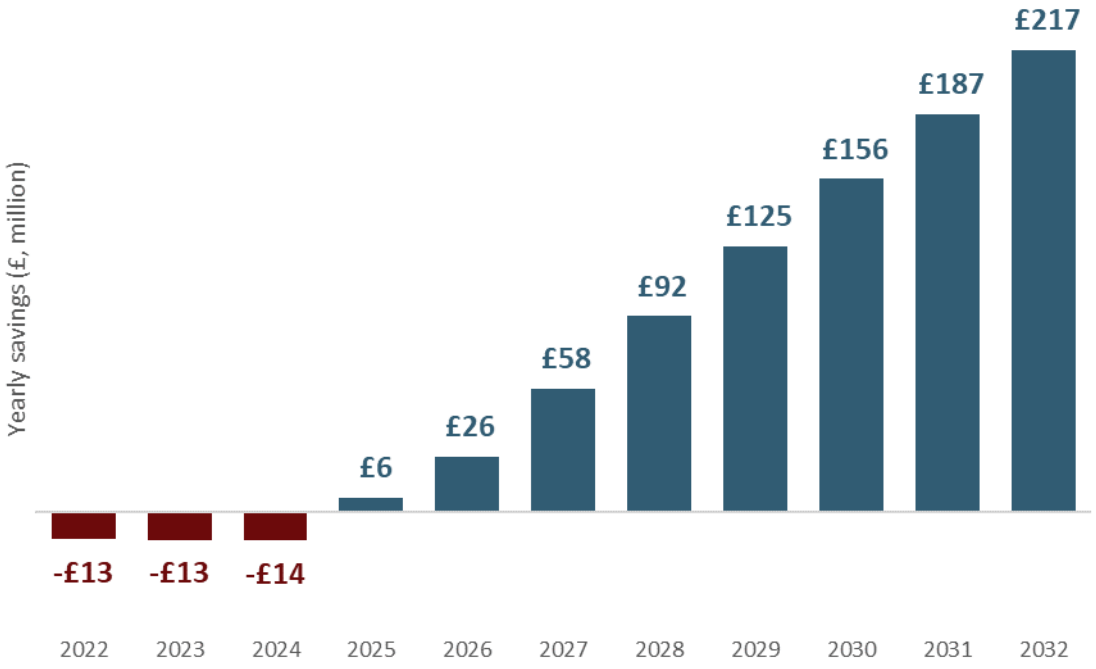
Figure 14: Costs of clinical oncologist training strategy compared to alternative strategy to deliver the same increase in WTEs



Source: WPI Economics

In practice, the strategies for clinical radiologists and clinical oncologist are complementary, as the increasing capacity to meet demand for radiologists will necessarily further drive the need to meet demands in clinical oncology. As such, figure 15 shows the overall cost implications of the combined strategy compared to the alternative of delivering the increases in WTEs through overseas recruitment and outsourcing. It shows very large yearly savings for the NHS throughout the majority of the ten-year period of the strategy. Cumulative savings over the ten-year strategy amount to £610 million.

Figure 15: Costs of clinical radiologists and clinical oncologist training strategy compared to alternative strategy to deliver the same increase in WTEs (positive numbers = training strategy is cheaper)



Source: WPI Economics

Cumulative impact of training strategy

Tackling the workforce shortage amongst clinical radiologists and clinical oncologists is necessary to ensure that patient outcomes do not continue to suffer. A range of different approaches can contribute to reducing the shortage, but none of these are feasible without a significant increase in training numbers. This report shows the potential impacts of a permanent increase of 130 clinical radiologist training starts per year and 50 clinical oncologist training starts per year. Overall results of this strategy are shown in table 5. In summary:

- By 2025, compared to current trends the strategy would deliver:
    - An increase of 112 WTE clinical radiologists (up to 5% of the required increase); and
    - An increase of 53 WTE clinical oncologists (up to 23% of the required increase).
- By 2030, compared to current trends the strategy would deliver:
    - An increase of 539 WTE clinical radiologists (45% of the required increase); and
    - An increase of 200 WTE clinical oncologists (95% of the required increase).
- Compared to an alternate approach of increasing overseas recruitment and outsourcing, the combined strategy would deliver this WTE increase with cost savings of £610 million by 2032.
- The approach would also be sustainable. With pressures already on overseas recruitment and outsourcing, it is unlikely that these routes could feasibly deliver such a large increase in WTE workforce.

Table 5: Cumulative impacts of training strategy for clinical radiologists and clinical oncologists

	Clinical Radiologists	Clinical Oncologists
Additional training starts by 2025	520	200
Additional training starts by 2030	1170	450
Additional WTEs by 2025	112	53
Additional WTEs by 2030	539	200
Total training costs by 2025 (£millions)	£102	£39
Total training costs by 2030 (£millions)	£359	£149
Additional salaries for WTEs by 2025 (£millions)	£0	£0
Additional salaries for WTEs by 2030 (£millions)	£120	£27
Total savings compared to alternative strategy by 2025 (£millions) (positive = savings)	-£30	
Total savings compared to alternative strategy by 2030 (£millions) (positive = savings)	£420	
Total savings compared to alternative strategy over five years (£millions) (positive = savings)	-£10	
Total savings compared to alternative strategy over 10 years (£millions) (positive = savings)	£610	

Source: WPI Economics

Impacts over a 5 and 10 year period – for each year of additional investment in training

We can also assess the impact of each additional year of training investment. This allows us to assess the longer-term impacts of each year of investment in isolation. Doing so shows us that:

Over a five-year horizon, each extra year of investment in training:

- Costs £69 million in additional training and salaries.
- Saves £30 million compared to delivering the increase in WTEs through increased outsourcing and overseas recruitment.

Over a ten-year horizon, each extra year of investment in training:

- Costs £152 million in additional training and salaries.
- Saves £190 million compared to delivering the increase in WTEs through increased outsourcing and overseas recruitment.

ANNEX: SUMMARY OF ASSUMPTIONS

	Clinical Radiologists	Clinical Oncologists
Workforce movements and costs		
Attrition	1%	1%
Retirement over 5 years	19%	19%
Current LTFT working	8%	8%
Increase in LTFT working (ppt over 5 years)	3%	2%
Salary	£84,667	£84,667
Total on & pension costs	£29,633	£29,633
Agency fees for overseas recruitment	20%	20%
Training		
Yearly training costs	£80,000	£80,000
Attrition of trainees (during training)	10%	13%
Attrition of trainees (during training) IR	10%	
Attrition of trainees (following training)	7%	9%
% contribution of WTE for trainees per year	0%	0%
Yearly trainees starting - base	300	65
Of which non-IR	246	0
Of which IR	54	0
Training strategy		
Additional trainees starting (on top of base)	130	50
Years of additional	20	20
Of which non-IR	110	
Of which IR	20	
Alternative strategy to meet additional WTEs		
Proportion from outsourcing	90%	0%
Proportion from overtime	-	0%
Proportion from overseas	10%	100%
Improved working practice (e.g. AI & skills mix) 2025	20%	10%
Improved working practice (e.g. AI & skills mix) 2030	50%	30%
Costs		
Outsourced cost per exam	£75	-
Salary	£84,667	£84,667
Total on & pension costs	£29,633	£29,633
Agency fees for overseas recruitment	20%	20%
Contribution of trainees (WTE, by year of training)		
1	0	0.2
2	0.2	0.2
3	0.2	0.2
4	0.5	0.5
5	0.5	0.5
6	0.5	0.5

Endnotes

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