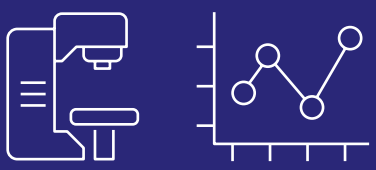
IPEM
Institute of Physics and Engineering in Medicine

# Radiotherapy Census Report 2023



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# Introduction

Between October and December 2023, IPEM's Workforce Intelligence Unit conducted a Radiotherapy Workforce Census. The purpose of the census was to provide an in-depth analysis of current workforce issues, with future projections and recommendations to tackle workforce shortages.

All Heads of Radiotherapy Physics and Engineering services across the UK, including NHS and independent providers, were invited to take part in the census. Sixty responses were received, yielding a **93% response rate**.

### Data collection was performed for the following professional groups:

- **Clinical Scientists**
- **Clinical Technologists (Physics)**
- **Clinical Technologists (Engineering)**
- **Other staff, including:**
  - Junior and trainee physicists
  - Administrative support staff
  - Quality managers
  - Business managers
  - Clinical pathway co-ordinators
  - IT support staff (technicians, software engineers, clinical system administrators)
  - Clinical computing staff

### Census data were analysed to inform:

- **Staff establishment and vacancy rates, including:**
  - Regional vacancy rates
  - Tracking of vacancy rates over time
  - Vacancy rates by Agenda for Change (AfC) banding
  - Vacancy rates in comparison to IPEM's staffing recommendations
  - Specific difficulties with recruitment
- **Age profile within the establishment**
- **Staffing provision satisfaction within each profession**
- **Current training levels and future workforce projections**
- **Quality of medical physics equipment**

# Executive Summary

At over 2000 staff across the UK, Radiotherapy Physics accounts for a large proportion of the workforce in medical physics and clinical engineering. Across all professional groups in Radiotherapy Physics, **there is currently an average vacancy rate of 8%**. This figure is unsustainably high – and it is likely to increase further if appropriate action is not taken, due to predicted training shortfall and proportion of staff approaching retirement age.

An active pipeline of staff entering the workforce remains a priority. To this end, an increase in funding is required to boost the annual allocation of trainees. Established training schemes and in-service training routes should both be supported.

**Budget holders and training centres should be aware of all available training routes, including (but not limited to):**

- Academy of Healthcare Science, Scientist Training Programme Equivalence
- Association of Clinical Scientists Route 2
- Healthcare Science Practitioner Degree Apprenticeships
- IPEM Clinical Scientist Guided Training Scheme
- IPEM Clinical Technologist Training Scheme
- Modernising Scientific Careers, Scientist Training Programme
- Scottish Medical Physics and Clinical Engineering Training Scheme

Local and regional methods for supporting training, such as regional practice educators in England, allow centres to benefit from economies of scale in training provision. Increased funding for, and promotion of, these resources should be considered.

We continue to recommend increasing funds allocated to expanding the establishment of staff posts in the "Other Staff" professional group. This will work to ease pressure on Clinical Scientists and Technologists.

Finally, ensuring available training routes for established staff, and providing opportunities to fill vacant senior posts, remain important considerations. These actions will support career progression, facilitating an appropriate skill mix within the workforce.

All of the above actions will allow for gradual easing of workforce pressures across all levels and demographic groups. For instance, supporting training and career progression of more junior staff will ease pressure on more experienced staff, which may increase retention in this group.

> **An active pipeline of staff entering the workforce remains a priority.**

# Key Findings

Since the previous census in 2021, vacancy rates across the professions in Radiotherapy Physics have remained relatively stable – the overall vacancy rate remains unsustainably high at 8%. However, a predictive model for the Radiotherapy workforce suggests that the projected trainee output will not redress the current workforce shortage in the next 3 years.

| | In Post (WTE) | Vacancies (WTE) | Vacancy Rate |
|---|---|---|---|
| Clinical Scientist | 865.1 | 71.1 | 8% |
| Clinical Technologist (Physics/Dosimetry) | 611.1 | 46.6 | 7% |
| Clinical Technologist (Engineering) | 315.6 | 30.8 | 9% |
| Other Staff | 58.0 | 3.6 | 6% |
| **Total** | **1843.4** | **158.5** | **8%** |

*Table 1: Number of whole time equivalent (WTE) posts that are filled, and vacant, with the proportion of vacant posts relative to the establishment across each professional group.*

**8%**

**average vacancy rate in Radiotherapy**

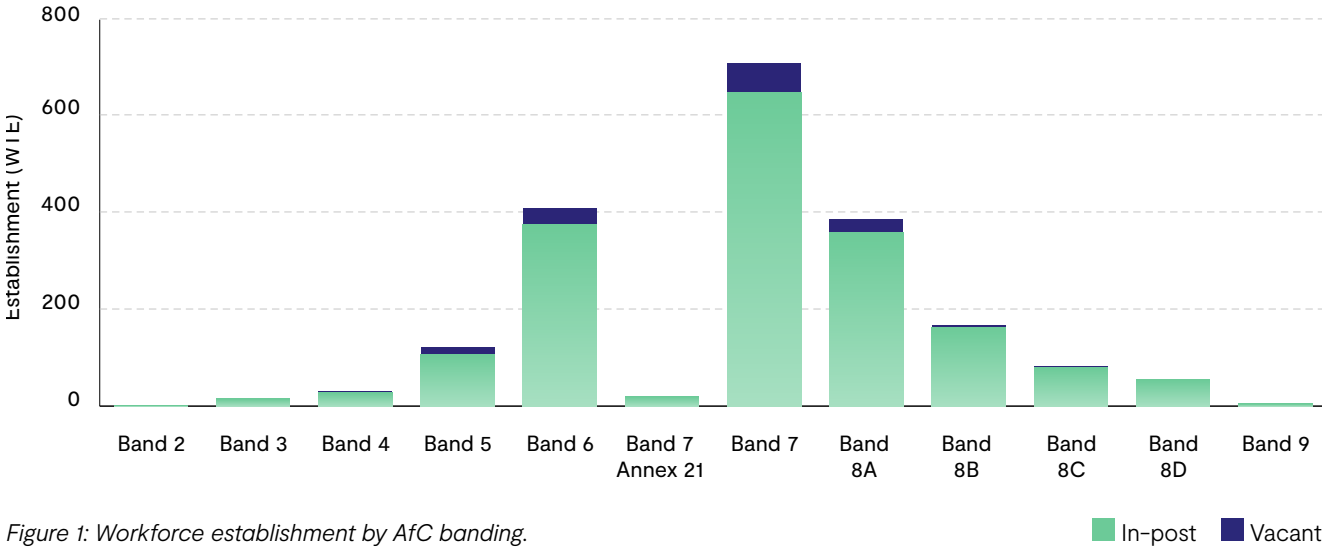


*Figure 1: Workforce establishment by AfC banding.*

Most established posts are at Agenda for Change (AfC) bands 6, 7, and 8a. Most WTE vacant posts are also at these bands. This indicates a shortfall in training output, as positions for trainees and newly qualified professionals typically sit at bands 6 and 7. In comparison, an emergent theme from comments was difficulty in recruiting to experienced posts, although vacancies at higher levels are less numerous. This may reflect departments who recruit staff at lower bands and train in-house to fill vacancies at higher bands.

Approximately 25% of the workforce is aged 50 or over. In comparison, slightly more than 17% of the workforce is between 20 and 29 years of age – these individuals will typically be in the early-career stage, either working as trainees or newly qualified staff. As all roles are graduate level at minimum, most will enter the field in their early twenties: for this reason, the Radiotherapy workforce is likely to be older than the UK working population overall. However, in the context of higher numbers of UK workers reporting long-term sickness[1] and taking early retirement[2], the number of professionals in higher age brackets prompts urgent consideration of succession planning within the profession.

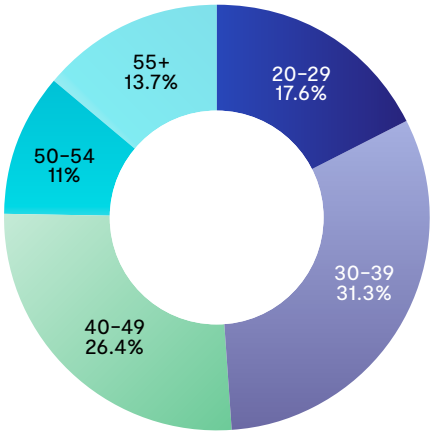


*Figure 2: Age profile of the Radiotherapy Physics establishment.*

**Approximately**

# 25%

**of the Radiotherapy Physics workforce is aged 50 or over**

# Establishment and Vacancies

# Vacancy rates over time

Overall, vacancy rates have remained relatively stable since the previous census in 2021. This is encouraging, particularly given additional pressures on the workforce caused by Brexit and the Covid-19 pandemic. However, a recent report suggests that this may not account for increases in the incidence of long-term sickness in the workforce.[1] This may provide an avenue for further investigation within the Radiotherapy workforce.

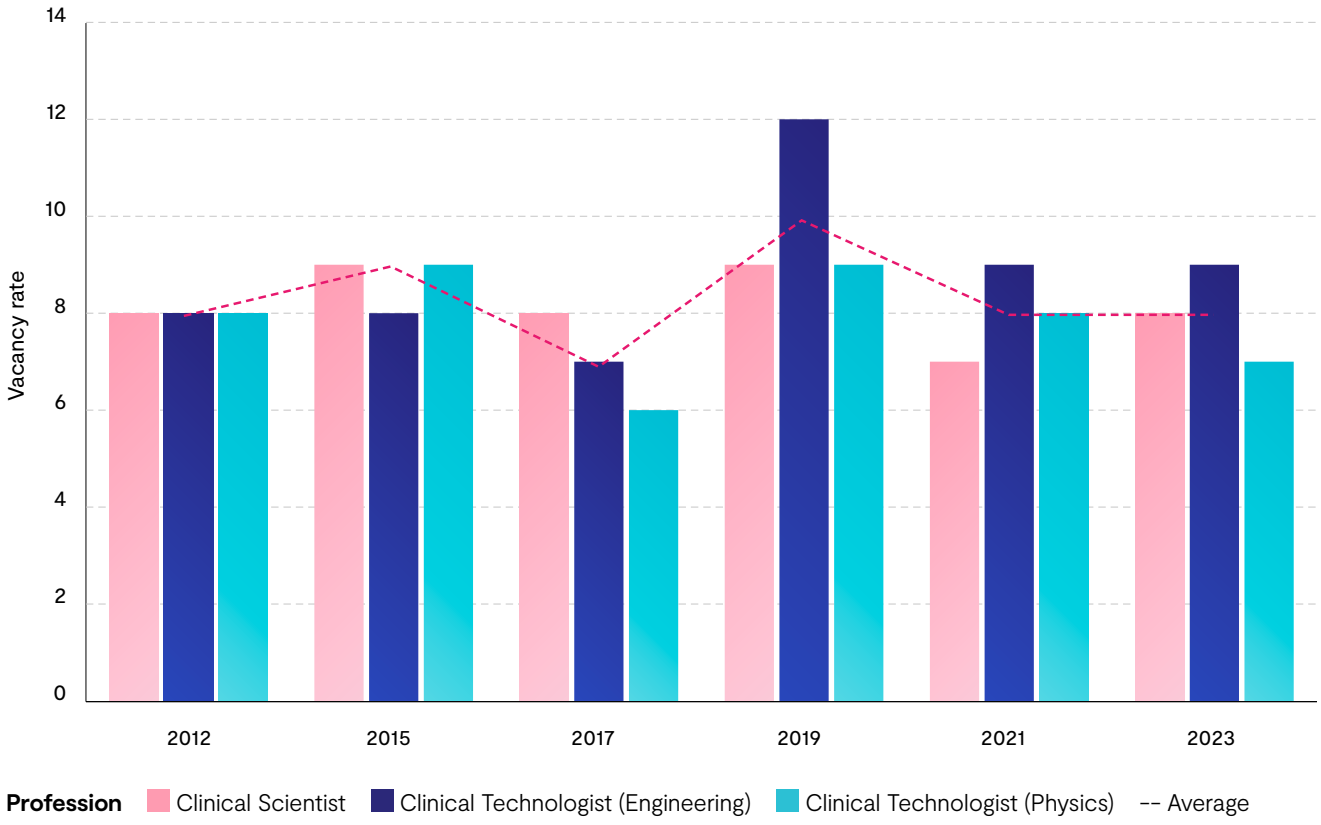


*Figure 3: Vacancy rates for Clinical Scientists and Clinical Technologists (engineering and physics) over time.*

# Comparison to other specialisms

Vacancy rates across medical physics and clinical engineering are unsustainably high across the board. In general, vacancy rates for Clinical Scientists are slightly higher than those for Clinical Technologists, although Nuclear Medicine is an exception to this. The Radiotherapy Physics workforce has a lower vacancy rate than other specialisms overall.

Caution must be exercised when devising solutions to vacancy rates in other sub-specialisms. The most sustainable approach would be to support additional training opportunities within all sub-specialisms, rather than to attract trainees away from Radiotherapy and into the other sub-specialisms.

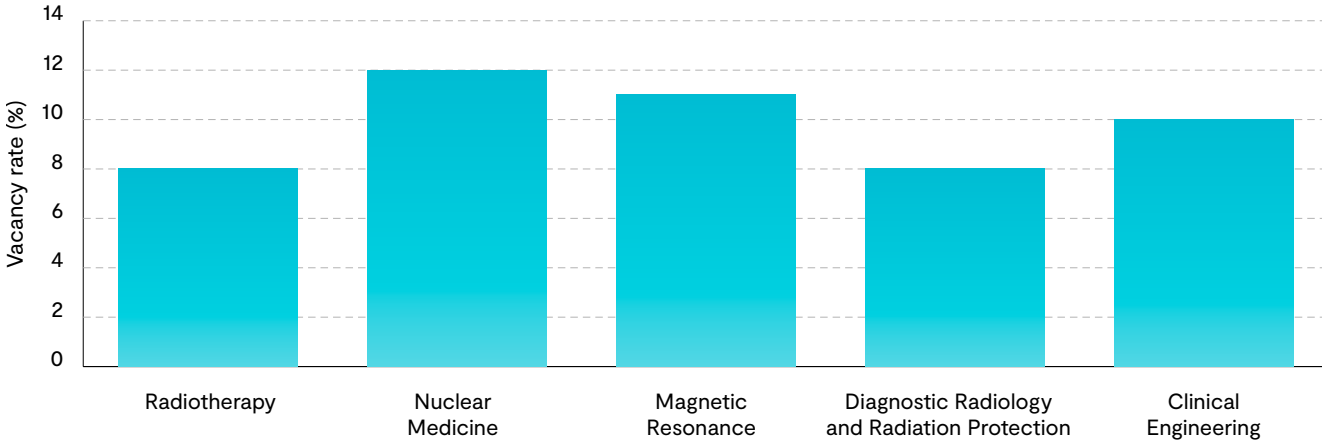


*Figure 4: Overall vacancy rates for the sub-specialisms in medical physics and clinical engineering.*

# Comparison to IPEM Staffing Recommendations

Recommendations for NHS Radiotherapy services across the different staffing groups have been developed by IPEM. Respondents were asked to provide the staffing levels for Clinical Scientists, Clinical Technologists, and Medical Physics Experts recommended for their organisation. Table 2 shows current staff in-post, recommended staffing levels, and the increase in staffing required to meet IPEM recommendations.

| Profession | Current In Post | Recommended* | Requirement* | Requirement* (%) |
|---|---|---|---|---|
| Clinical Scientists | 806.2 | 932.1 | 125.9 | 14% |
| Clinical Technologists (Physics) | 577.8 | 755.3 | 177.5 | 24% |
| Clinical Technologists (Engineering) | 313.5 | 432.8 | 119.3 | 28% |
| Medical Physics Experts | 449 | 591 | 142 | 24% |

*Table 2: Current number of Radiotherapy Physics staff in-post compared to IPEM recommended staffing for the establishment.*

**This table includes data from less than 100% of respondents; in addition, recommended staffing levels were estimated for some centres, on the basis of historical data.*

To fill current vacancies and meet IPEM's staffing recommendations, staffing across Clinical Scientists and Clinical Technologists must increase by 25% overall. Clinical Scientists require a 14% increase, and Clinical Technologists in Physics and Engineering require a 24% and 28% increase respectively.

IPEM furthermore recommends that the number of MPEs should increase by 24%. These represent a sub-group of Clinical Scientists, who are qualified to provide expert advice on service provision. Due to difficulties quantifying time allocated to MPE activities, this figure is measured as a headcount, as opposed to WTE.

We recognise that service requirements may vary widely, dependent on departmental configuration and size. However, these figures usefully demonstrate the need for increased staffing across all professional groups, particularly Clinical Technologists.

# Regional vacancy rates

Staffing levels were assessed relative to geographic region (Scotland, Northern Ireland, Wales, and the seven regions of NHS England). This information is shown in Figures 5-10, for Clinical Scientists and Clinical Technologists in physics and engineering respectively. Complete data is available on the population served, and the number of Linacs, at each Trust in England. Comments can be made on establishment and vacancy rates normalised for population or Linacs for regions in England. However, as data is not available for the other devolved nations, this has not been incorporated into the figures.

## Clinical Scientist Establishment by Region

The highest vacancy rates for clinical scientist posts were found in Northern Ireland at 19%, and the East of England at 16%. London has the largest Clinical Scientist establishment per million population served in England (16.6 WTE), and the North East and Yorkshire has the smallest (12.2 WTE). A small number of responses were received from Northern Ireland: this suggests that the high vacancy rate may be due to a small number of services being stretched thinly across a wide region. In the East of England, the high vacancy rate could indicate difficulties in recruitment or retention. Emergent themes from respondent comments on vacancy rates included cost of living, remoteness, and attractiveness of the location for newly qualified professionals.

The lowest vacancy rates for Clinical Scientist posts were found in the North West at 0%, and the North East and Yorkshire at 3%. The census only received two responses from centres in the North West, which makes interpreting this figure difficult.

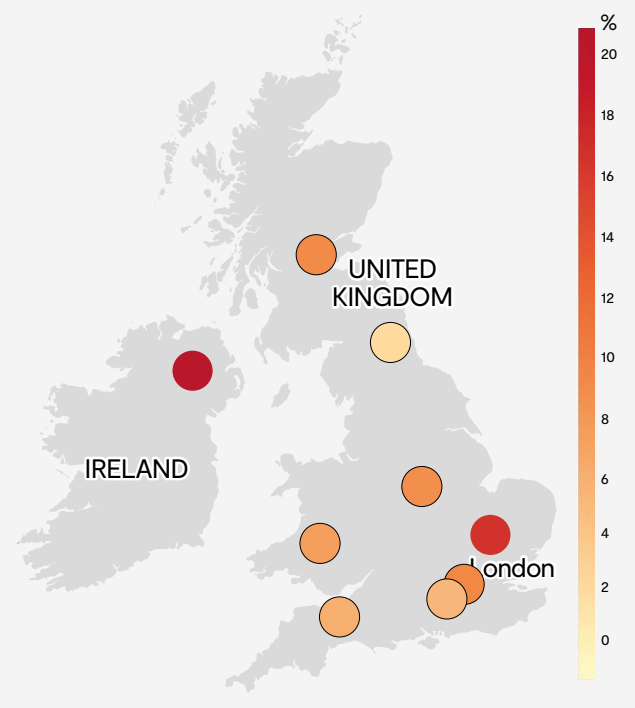


*Figure 5: Geographical establishment of Clinical Scientists in Radiotherapy. Marker colour indicates vacancy rate, as a percentage.*

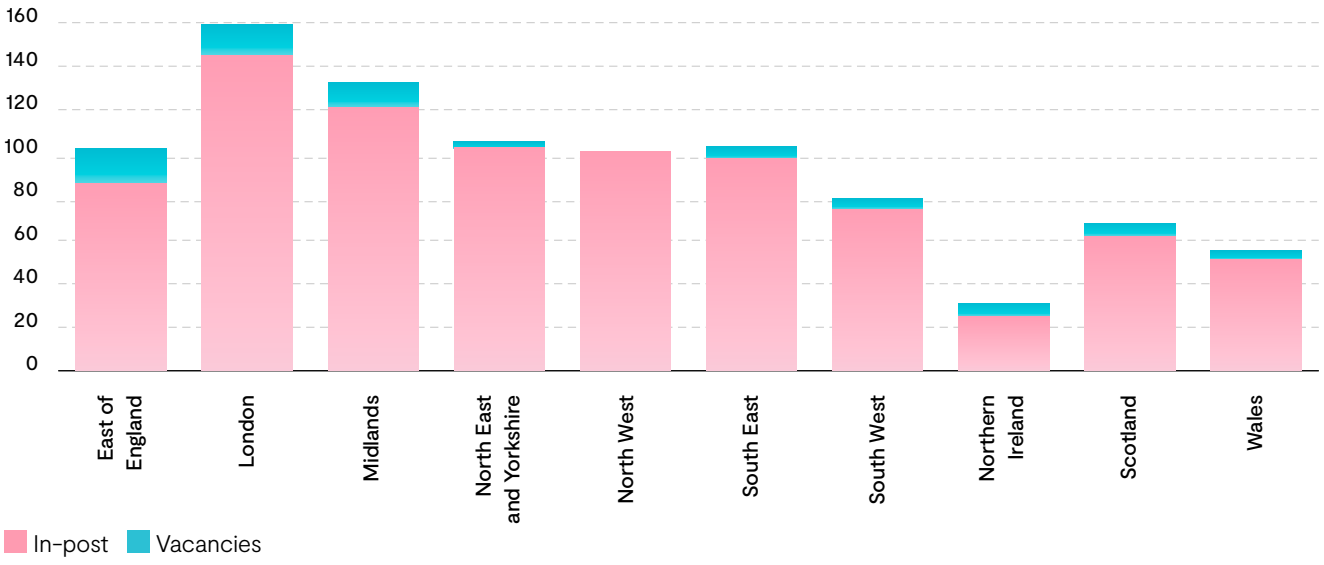


*Figure 6: Level of WTE staffing among Clinical Scientists, in post and vacant, in each region.*

## Clinical Technologist (Physics) Establishment by Region

The highest vacancy rates for Clinical Technologists in physics were found in Northern Ireland at 13%, and Wales at 12%. This, again, may be due to the services of fewer organisations being stretched thinly across wider areas. Within England, the highest vacancy rates were found in the Midlands at 11% and the South East at 10%. The South East has the largest Clinical Technologist in Physics establishment per million population served in England (11.3 WTE), and the North West has the smallest (8.2 WTE).

The high vacancy rate and large establishment size in the South East may reflect high demand for services caused by a large population, or the contribution of a small number of larger centres. In the Midlands, Northern Ireland, and Wales, vacancy rates may be related to difficulties in retention: some respondents indicated in comments that Clinical Technologists wishing to progress professionally may do so by qualifying as Clinical Scientists and switching professions.

The lowest vacancy rates for Clinical Technologists in physics were found in the North East and Yorkshire at 0%, and the North West at 3%.

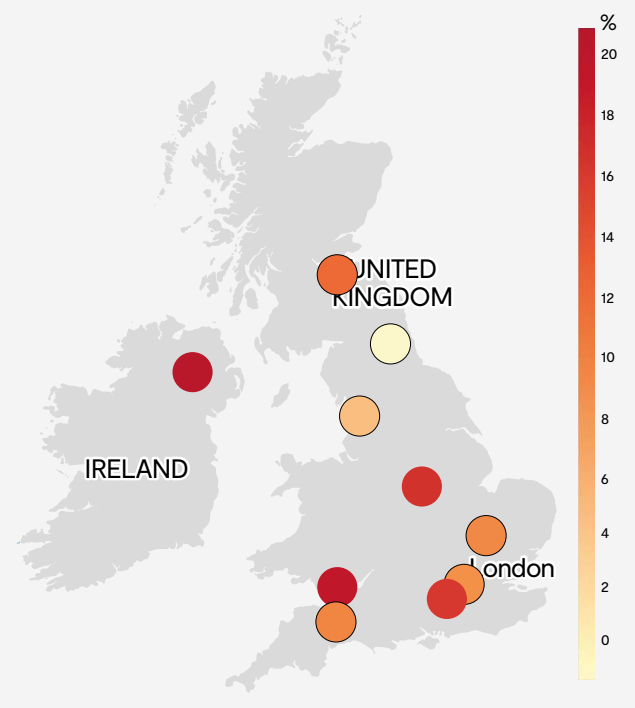


*Figure 7: Geographical establishment of Clinical Technologists (Physics) in Radiotherapy. Marker colour indicates vacancy rate, as a percentage.*

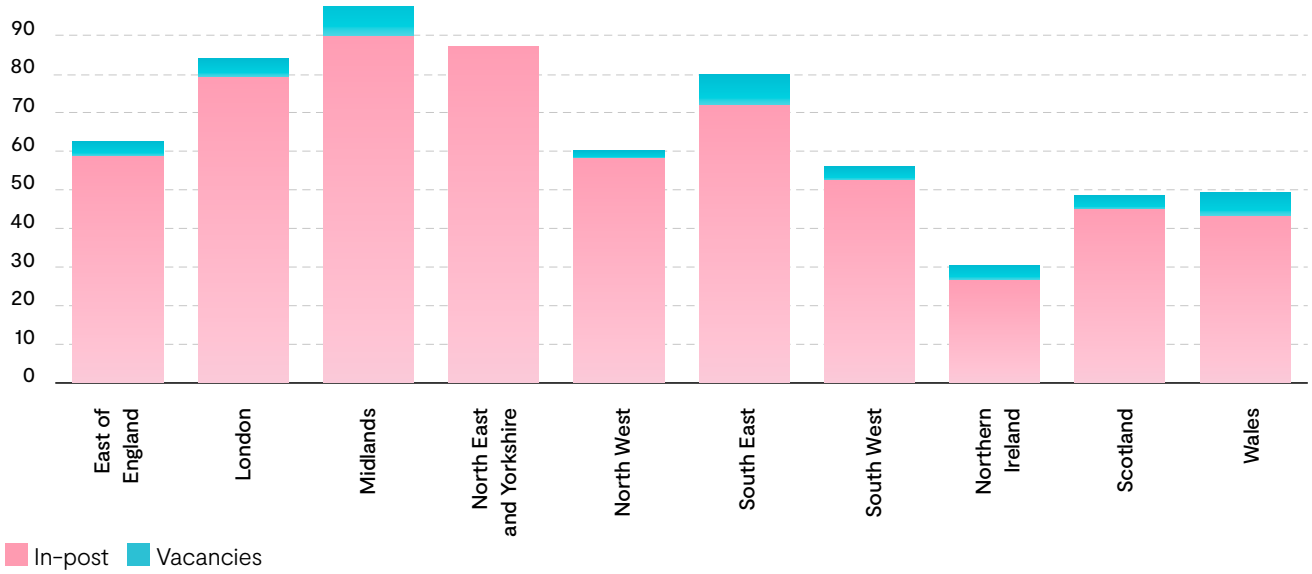


*Figure 8: Level of WTE staffing among Clinical Technologists (physics), in post and vacant, in each region.*

## Clinical Technologist (Engineering) Establishment by Region

The highest vacancy rates for Clinical Technologists in Engineering were found in the Midlands at 18% and Wales at 16%. The lowest were found in the North West at 0% and the South West at 1%. All but these two regions reported vacancy rates of 6% or higher, indicating that recruitment of Clinical Technologists in Engineering remains difficult. In this instance, establishment sizes across the regions of England were normalised to the number of Linacs in each region. The North West has the largest Clinical Technologist in Engineering establishment per Linac (2.0 WTE), and the South West and London each have the smallest (0.6 WTE). Of note, the establishment of Clinical Technologists in engineering is smaller in comparison with other professions across the UK. A substantial number of respondents commented on the lack of a dedicated training scheme for this profession, as a potential reason. Training is offered through IPEM's Clinical Technologist Training Scheme[3], under review at the time of writing.

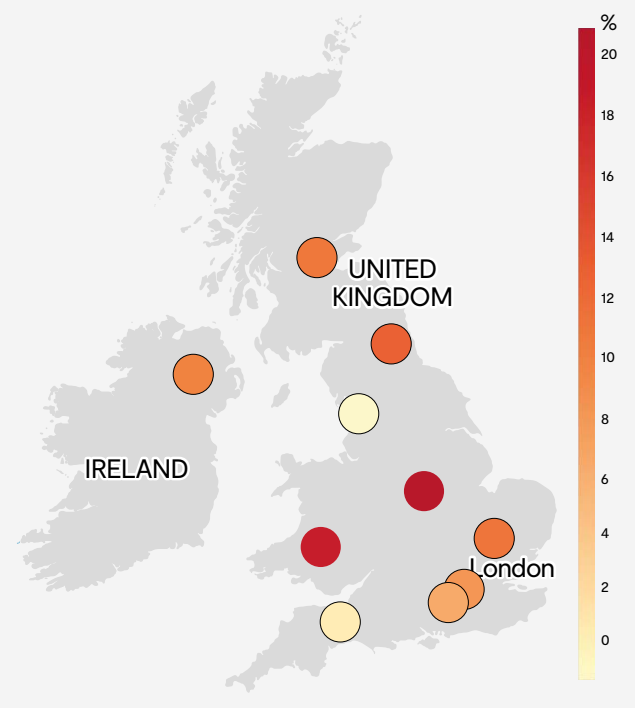


*Figure 9: Geographical establishment of Clinical Technologists (Engineering) in Radiotherapy. Marker colour indicates vacancy rate, as a percentage.*

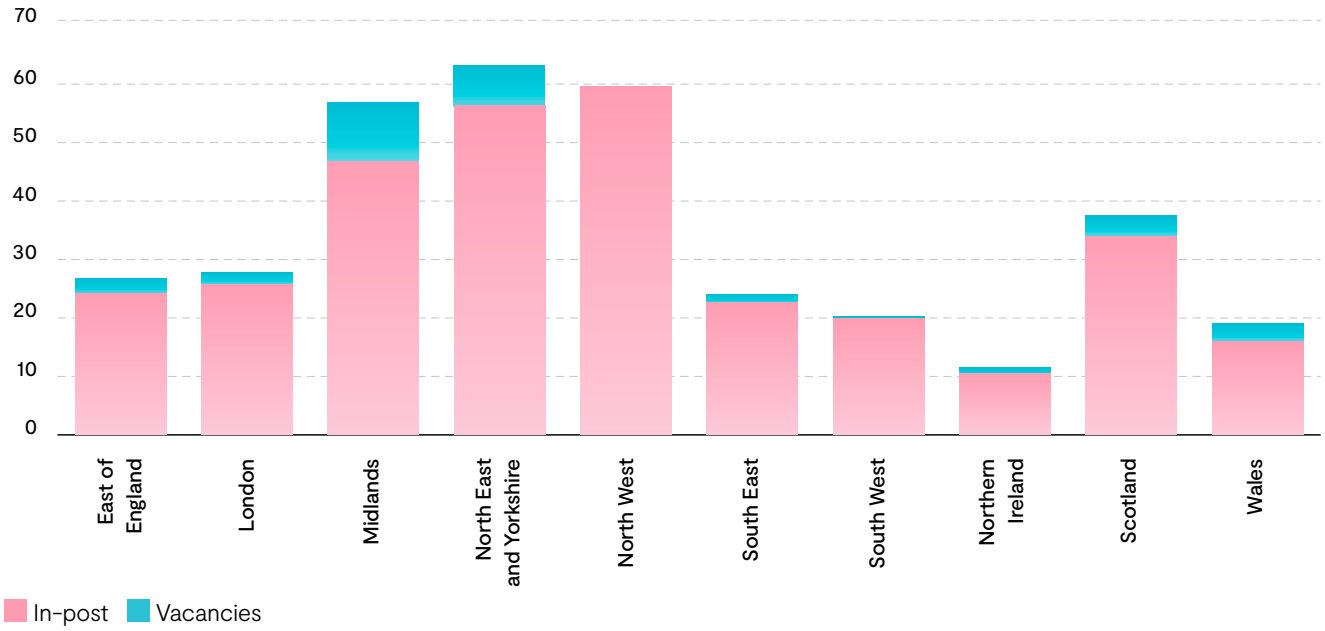


*Figure 10: Level of WTE staffing among Clinical Technologists (engineering), in post and vacant, in each region.*

Clinical Technologists in Engineering are also included within the scope of practice for registration on the Register of Clinical Technologists[4]. It is recommended that the training scheme is promoted with a special focus on Clinical Technologists in Engineering once review is complete.

When discussing areas with higher and lower vacancy rates, reasons have been suggested in relation to establishment size in the region. In some areas, it was suggested that a high vacancy rate may be related to thinly stretched services; in others, it was suggested that a high population may increase demand for services, thus increasing the need for medical physicists. When a Pearson correlation was performed between number of respondents and vacancy rates across regions, no significant correlation was found for any of the three professions. The relationship between establishment size and vacancy rates across regions of the UK is complex.

**Northern Ireland and the East of England have the highest Clinical Scientist vacancy rates in the UK.**

**The Midlands, Northern Ireland, and Wales have the highest Clinical Technologist vacancy rates in the UK.**

**Recruitment of Clinical Technologists in Engineering is difficult across the UK.**

# Workforce Banding Profile

Further analysis was performed to assess whether vacancy rates were primarily affected by difficulty in recruiting trainees, or due to skills gaps at higher levels. This was done by stratifying vacancy rates into NHS Agenda for Change (AfC) banding for all four professional groups.

### Clinical Scientists

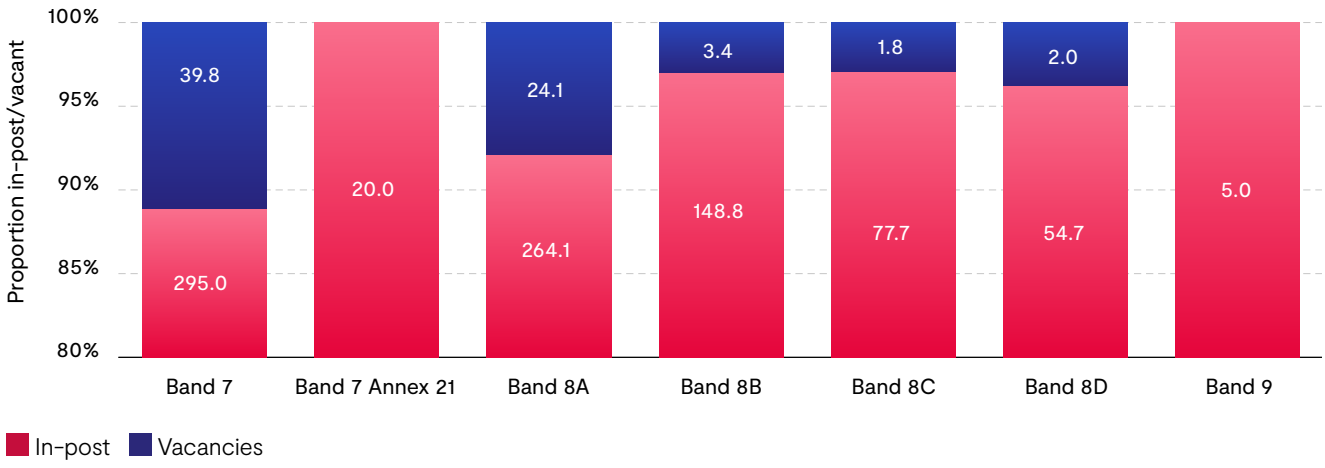


*Figure 11: Proportion of the Clinical Scientist workforce in-post and vacant by AfC banding (WTE is indicated by numerical data labels).*

> **Departments fill vacancies at higher bands by recruiting at lower bands, and training these staff.**


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Among Clinical Scientists, the highest proportion of vacant posts are at bands 7 and 8a. This may be indicative of too few training posts being created. However, comments indicated difficulty with recruitment of new and experienced staff alike. Notably, a larger proportion of comments focused on difficulties in recruiting staff at higher bands, although they were comparatively fewer in number. Many respondents stated that they overcome these difficulties by advertising a vacancy at a lower band, and train staff to be able to fulfil the more experienced roles that are needed. This may provide an explanation for the large number of Clinical Scientist vacancies at bands 7 and 8a.

Trends for Consultant Clinical Scientist (CCS) posts can be examined through analysis of posts at higher bands. This role is well-established within the NHS and describes staff acting alongside medical consultants, with whom they share the same level of professional competency, to provide valuable scientific clinical advice and care. They are responsible for quality improvement, innovation, and research to modernise and improve care within their discipline. For the present report, we assume that Clinical Scientists employed at Bands 8c and above in terms of NHS AfC banding are CCS staff.

**7%**

**of the Radiotherapy Physics workforce are Consultant Clinical Scientists**

We have examined trends among these posts over time by comparing present data to that of previous census reports, as shown in Figure 12.

Approximately 7% of the Radiotherapy workforce are classed as Consultant Clinical Scientists, with a current vacancy rate of 2.7%. This constitutes 2.4% of all vacancies in the Radiotherapy workforce. Although in absolute terms the number of CCS posts has been increasing over time, Figure 12 shows that relative to the establishment, the proportion of CCS posts has been continually decreasing. In spite of decreasing vacancy rates among these staff, this suggests that development of CCS staff is lagging behind the expansion of the Radiotherapy establishment.

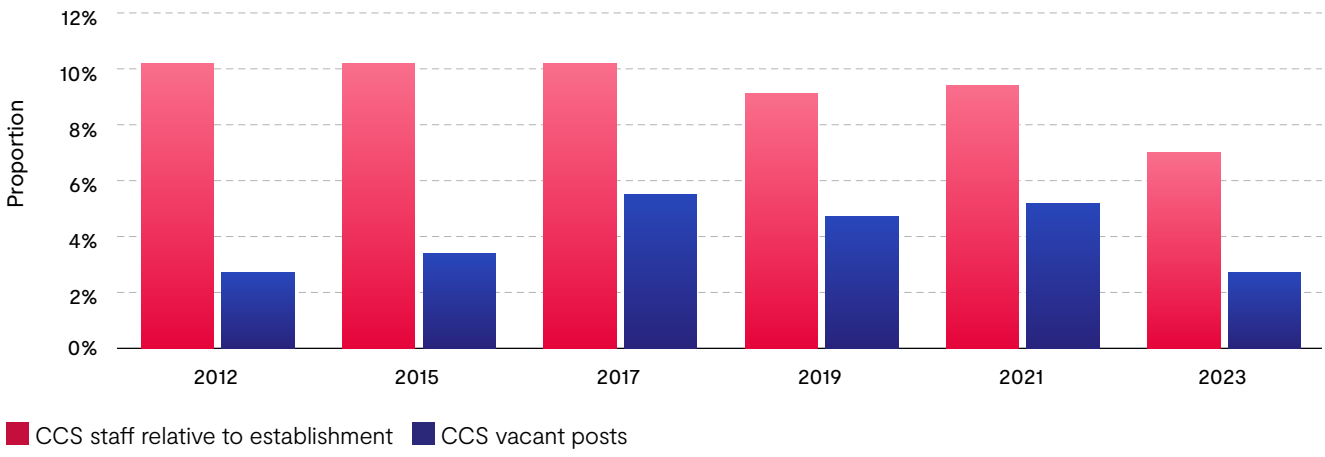



*Figure 12: Proportion of CCS staff in the workforce and proportion of CCS vacancies since 2012.*

## Clinical Technologists (Physics)

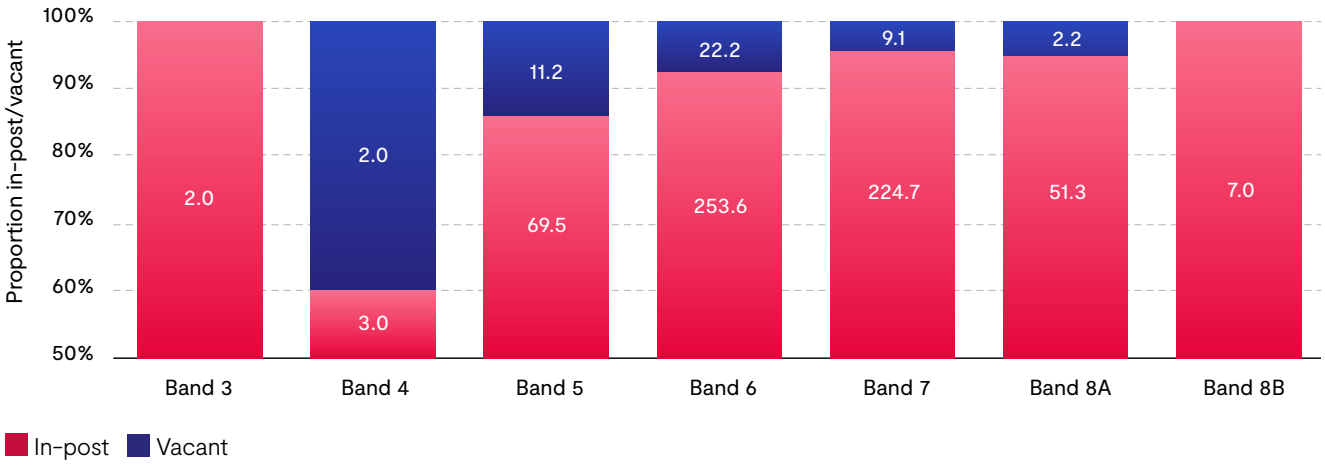



*Figure 13: Proportion of the Clinical Technologist (Physics) workforce in-post and vacant by AfC banding (WTE is indicated by numerical data labels).*

Clinical Technologists in Physics have the highest vacancy rates at Bands 5, 6, and 7, with bands 6 and 7 having the most WTE vacancies. This likely indicates difficulty with recruitment of early career staff. Shortfall in training numbers may be related to this.

In addition to training staff "in house" to achieve the level of experience required, respondents stated that they may handle recruitment difficulties by hiring staff from overseas. However, this process can be time-consuming and costly to employers. In addition, overseas applicants may not always present with qualifications and experience that are equivalent to staff in similar roles within the UK.

**Vacancy rates at a Band 5 and 6 level for Clinical Technologists (Physics) highlight issues relating to sufficient training provision for this staff group.**

## Clinical Technologists (Engineering)

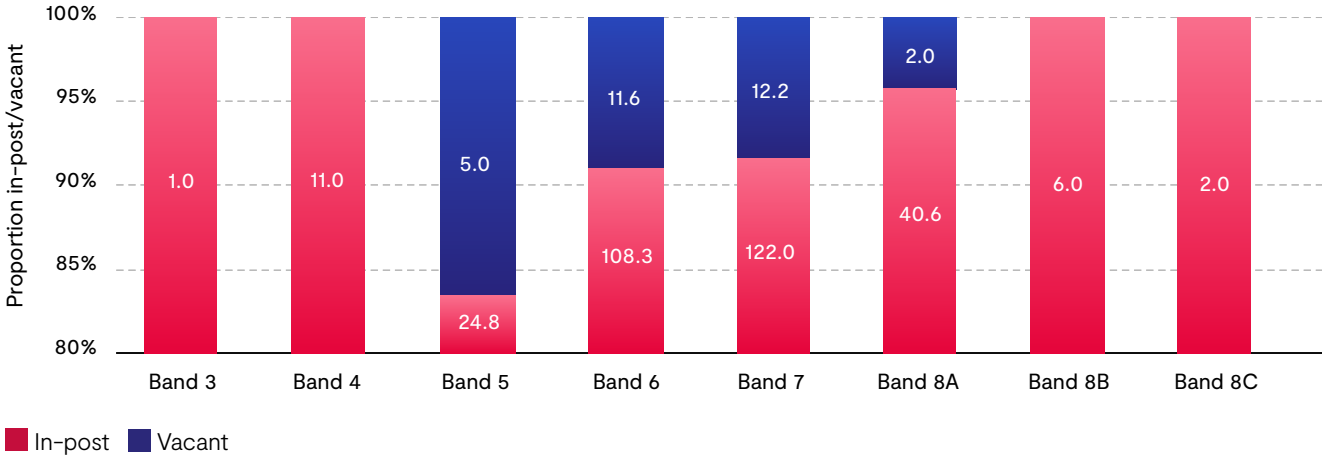



*Figure 14: Proportion of the Clinical Technologist (Engineering) workforce in-post and vacant by AfC banding (WTE is indicated by numerical data labels).*

For Clinical Technologists in Engineering, the largest number of vacancies exist at Bands 5 and 6. The highest vacancy rates exist at Bands 4 and 5, though note the comparatively smaller establishment size at these bands. Higher vacancy rates at lower bands may primarily indicate difficulties with recruitment of trainees. Difficulties with respect to training for this profession have been discussed. Although a "gold standard" for increasing trainee intake would involve the development of a supernumerary training route, it is expected that promotion of existing training pathways may aid in filling vacancies and growing the establishment.

**Most Clinical Technologist vacancies are at bands 5 and 6, indicating difficulties with recruitment of trainees.**

## Other Staff

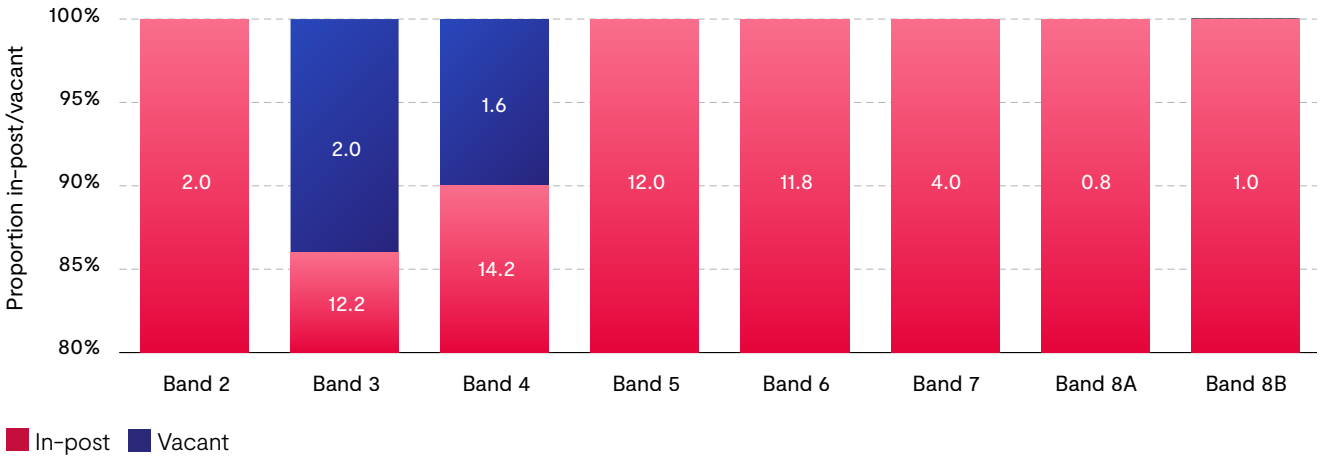
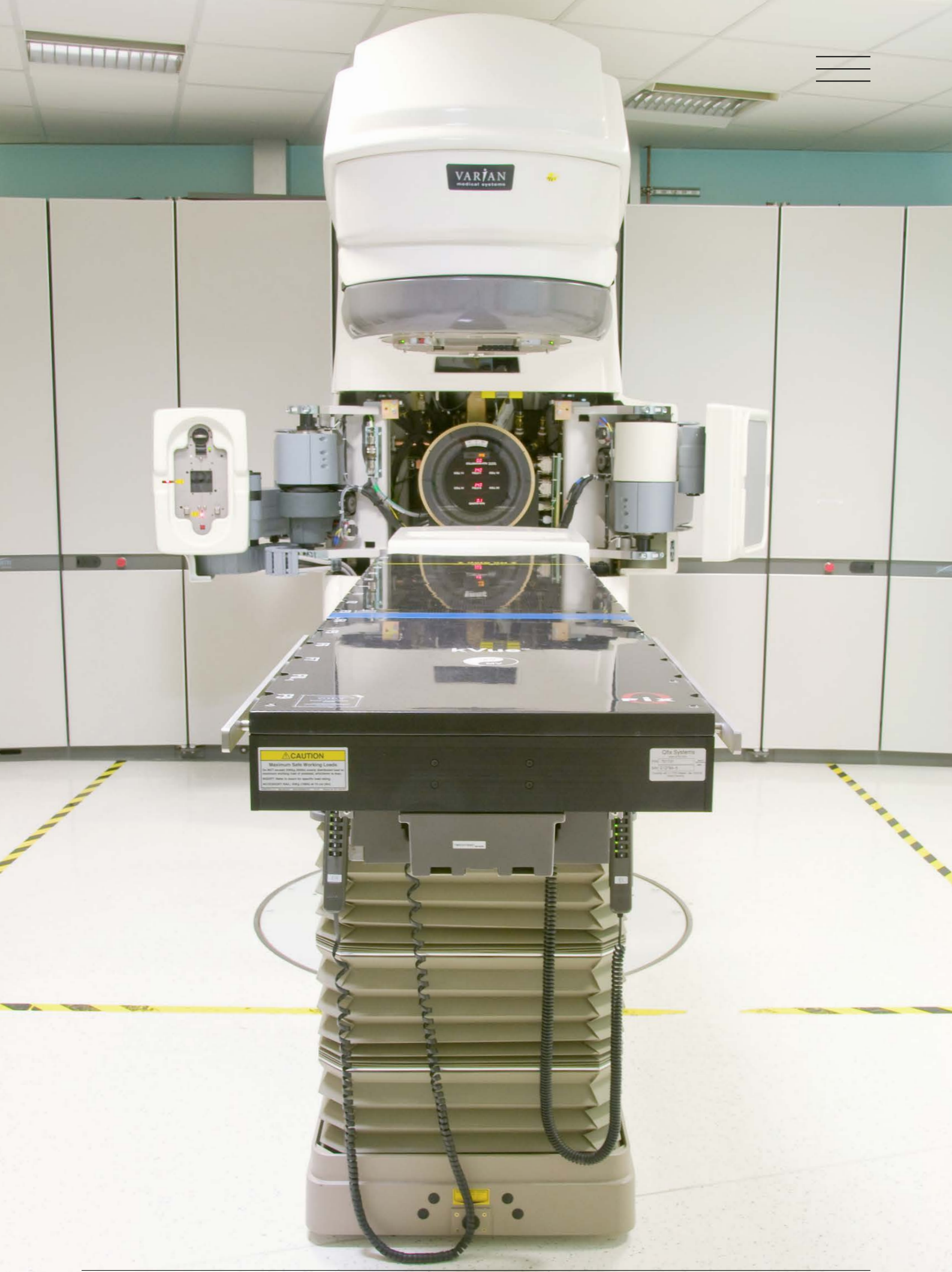



*Figure 15: Proportion of other staff in-post and vacant by AfC banding (WTE is indicated by numerical data labels).*

Posts within the category of "other staff" make up approximately 0.5% of the Radiotherapy establishment as of 2023. These are created when organisations have some flexibility with regards to recruitment and develop posts to support Clinical Scientists and Technologists where there are shortages. They include apprentice/trainee posts and quality and business managers, among other roles.

Bands 4, 5, and 6 have the largest establishment in this category. Comments indicate that these posts may have been created due to a shortage of Clinical Scientists and Technologists. They include administrative support roles, and trainee Clinical Scientist roles that do not require HCPC registration. Vacancy rates in this category are highest at Bands 3 and 4, which reflect trainee and administrative posts.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# Workforce Age Profile

Information on the age profile of the workforce can be used to make future predictions. To assess this, respondents were asked about the age profile of their staff.

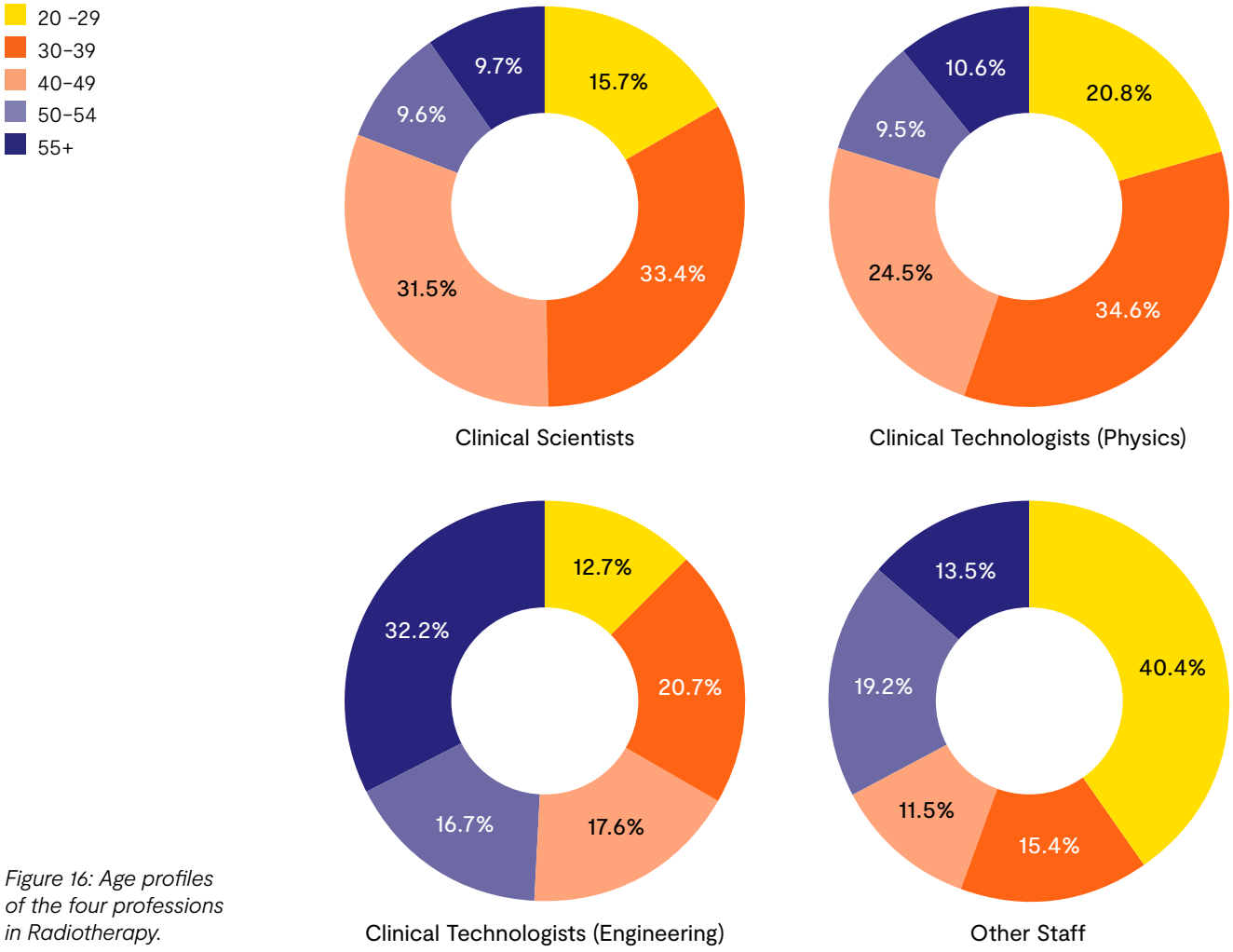



*Figure 16: Age profiles of the four professions in Radiotherapy.*

Although most NHS employees would not be expected to retire before age 65, they become eligible to claim their pension from age 55[5]. In addition, recent reports show that across the UK, the number of workers on long-term sick leave[1] and retiring early[2] has increased since the COVID-19 pandemic. Similar trends have been found in other healthcare professions[6]. This highlights additional pressures that may influence interpretation of current age profiles.

Approximately one third of Clinical Technologists in Engineering are 55 years or older, and nearly half of the workforce in this profession is 50 years or older. This has been seen in previous Radiotherapy census reports, and remains of great concern. Unless action is taken to improve training and recruitment, the already small establishment in this profession is likely to deteriorate further. A further area of concern is staff retention: efforts towards ensuring high retention will ensure that the valuable contributions of experienced staff continue to benefit the Radiotherapy workforce[7].

Over 40% of the "Other Staff" workforce is between 20 and 29 years of age. This is likely reflective of the number of staff in trainee or apprentice roles, and staff working towards HCPC registration who are currently employed at a lower band.

Across the NHS, approximately 15% of staff are age 55 or older[8]. Overall, the Radiotherapy workforce has a lower proportion of staff in this age range than the NHS. However, the proportion of Clinical Technologists in Engineering in this age range is markedly higher than the NHS average, which further highlights the cause for concern.

**Approximately one third of Clinical Technologists in Engineering are aged 55 or over.**

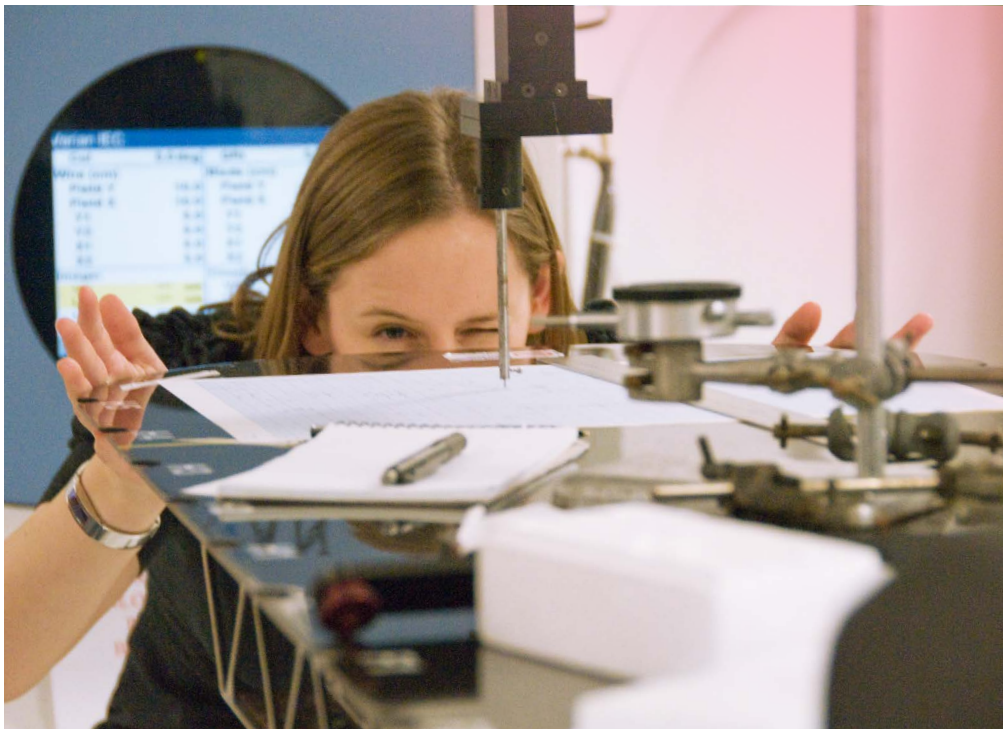
# Staffing Provision

# Clinical Scientists and Clinical Technologists

Information on respondents' perception of staffing levels provides valuable insight into the impacts of vacancy rates and staffing profiles on service provision. To this end, respondents were asked whether they felt that their staffing provision was

- Too much
- Sufficient
- Too little
- Far too little

This question was asked with reference to four professional groups: Clinical Scientists, Clinical Technologists (in Physics and Engineering), Medical Physics Experts (MPE), and Radiation Protection Advisors (RPA).



## Clinical Scientists and Clinical Technologists

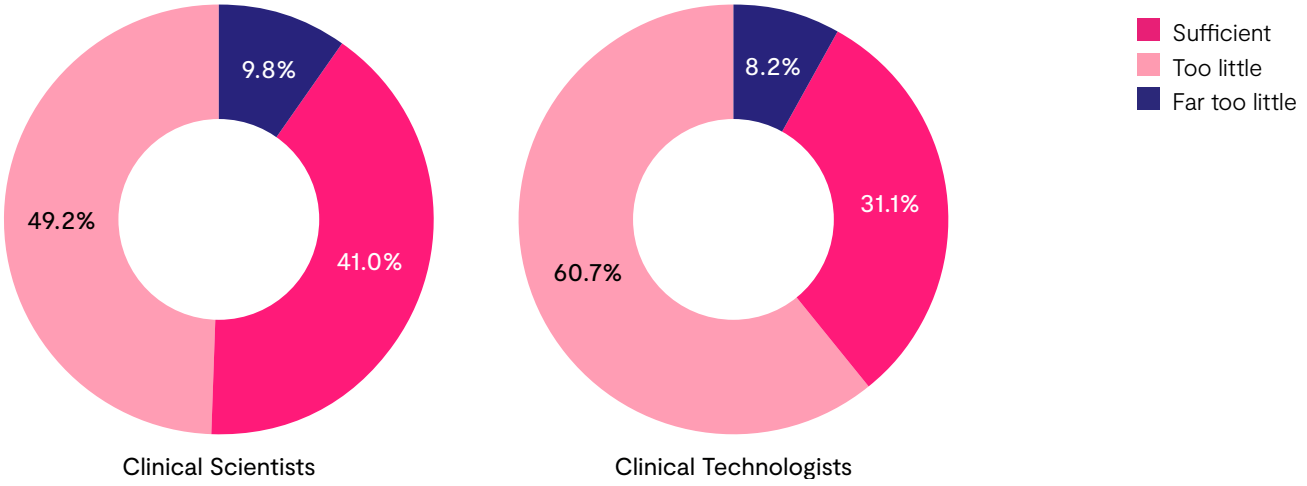



*Figure 17: Proportional responses on staffing provision for Clinical Scientists and Clinical Technologists.*

No respondents indicated that they felt their staffing provision was "too much" for any of the four professional groups. Just under 70% of respondents indicated insufficient staffing provision for Clinical Technologists. Moreover, 59% of respondents indicated insufficient Clinical Scientist staffing provision to provide a safe and effective service.

It was observed that centres with higher Clinical Scientist vacancy rates appeared more likely to report insufficient staffing provision. To test this, a Spearman's rank correlation was computed to assess a potential relationship. The result was statistically significant, $r(59) = 0.412$, $p = 0.001$. When a similar statistical test was computed for Clinical Technologists, a non-significant result was obtained, indicating a more complex relationship between vacancy rates and staffing provision satisfaction for this group. The highest incidence of reported insufficient staffing provision for Clinical Scientists and Clinical Technologists could be found in the East of England.

In some cases, there is a mismatch between vacancy rates and staffing provision satisfaction. Respondents expressed concerns regarding future service provision: while they feel that they currently have enough staff to provide a safe and effective service, finding cover for maternity or long-term sick leave would likely be difficult. Others stated that they are unable to dedicate enough staff time to training, research, and development of services. These factors are likely to add further strain to services, as they may affect their ability to meet future clinical need.

**70%**

**of Radiotherapy departments feel they have insufficient Clinical Technologists**

**59%**

**of Radiotherapy departments feel they have insufficient Clinical Scientists**

## Medical Physics Experts and Radiation Protection Advisors

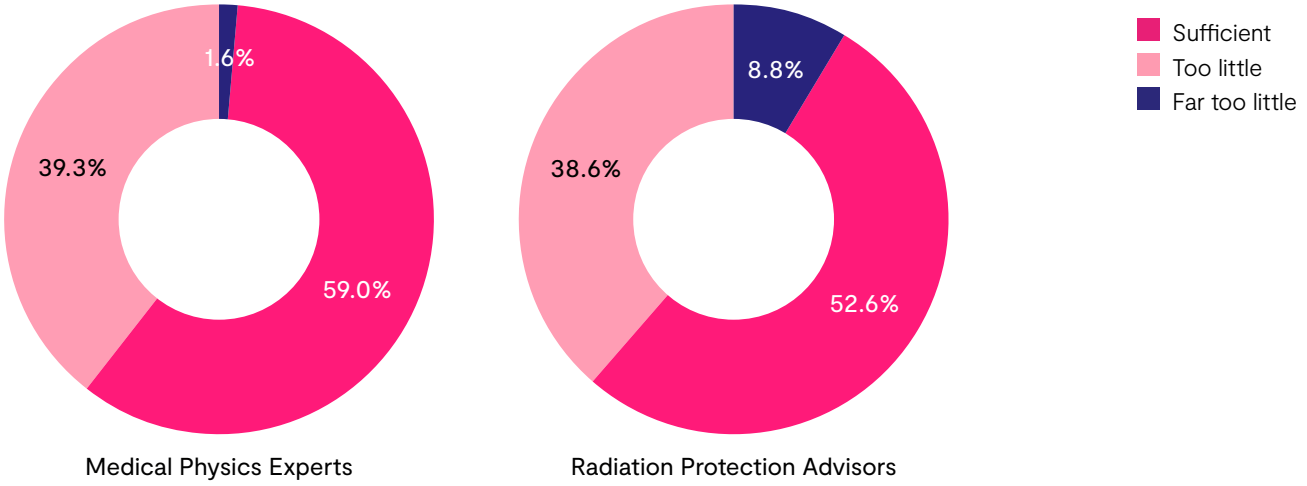
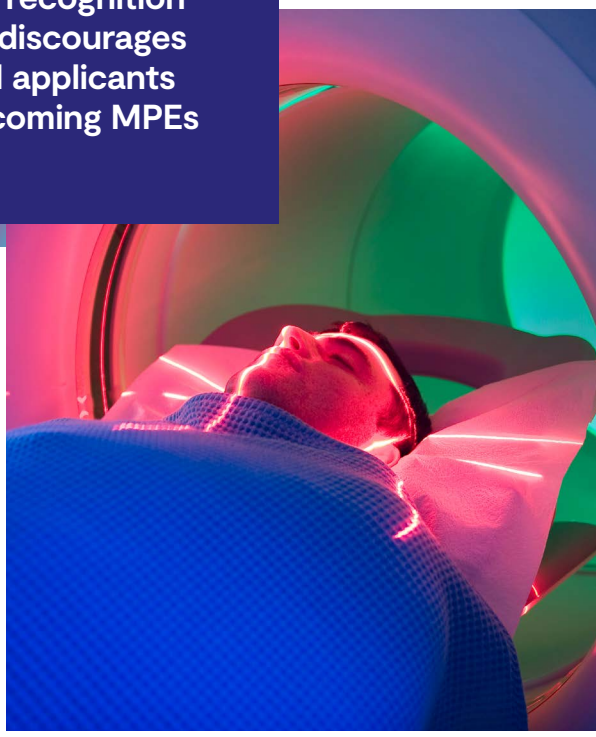



*Figure 18: Proportional responses on staffing provision for MPEs and RPAs.*

A total of 494 MPEs and 16 RPAs were reported. Respondents indicated sufficient staffing provision of MPEs and RPAs at rates of 59% and 53% respectively. Higher satisfaction is likely due to the fact that some MPEs and RPAs provide services for more than one Radiotherapy centre simultaneously. In addition, some Radiotherapy departments will receive RPA services from an individual in another specialism (for example, Radiation Protection). However, 41% and 47% are indicating insufficient staffing provision for each profession respectively, which remains unsustainably high. An emergent theme from comments on MPE staffing provision was the complexity and time commitment of the MPE recognition process. In some cases, it was specifically stated that this discouraged potential applicants from becoming recognised as MPEs.

> **The complexity of the MPE recognition process discourages potential applicants from becoming MPEs**



| Region | MPE | RPA | Population Served (Millions) | Insufficient MPE Provision | Insufficient RPA Provision |
|---|---|---|---|---|---|
| East of England | 50 | 1 | 6.7 | 43% | 29% |
| London | 70 | 2 | 9.6 | 50% | 67% |
| Midlands | 71 | 1 | 10.0 | 45% | 40% |
| North East and Yorkshire | 62 | 1 | 8.7 | 33% | 20% |
| North West | 58 | 3 | 7.3 | 33% | 50% |
| South East | 58 | 1 | 7.1 | 40% | 40% |
| South West | 51 | 7 | 5.5 | 22% | 67% |
| Scotland | 39 | 0 | Data unavailable | 60% | 20% |
| Wales | 19 | 0 | Data unavailable | 67% | 67% |
| Northern Ireland | 16 | 0 | Data unavailable | 0% | 50% |

*Table 3: Total headcount of MPEs and RPAs by region, with the proportion of respondents in each region reporting insufficient MPE and RPA provision.*


CLINAC

# Training and Future of the Workforce

# Predictive Model

A predictive model has been created to determine the expected, and required, numbers of trainee Clinical Scientists and Technologists entering the workforce over the next 5 years. These predictions are based on training and recruitment within the UK, and trends seen across the NHS in staff attrition over time.

Recruitment from overseas is accounted for in the current establishment, and is therefore already incorporated within the overall workforce model. Overseas recruitment is used successfully by some centres to improve staffing, but this process is complex and often lengthy. In addition, recent changes to the Immigration Salary List (previously the Shortage Occupation List) may have increased the difficulty of this process, particularly among Clinical Technologists in Engineering. The extent to which this influences the viability of overseas recruitment in reducing staffing shortages, remains to be seen.

| Staffing requirement | Trainee requirement per annum | Trainee prediction per annum |
|---|---|---|
| Maintaining workforce | 66 | 55 |
| Meeting IPEM staffing recommendations in 3 years | 75 | |

*Table 4: Required and predicted trainees entering the workforce per annum.*

# Clinical Scientists

The current census data shows that there are 71.1 WTE vacant Clinical Scientist posts.

Figure 19 shows the number of newly qualified Clinical Scientists entering the Radiotherapy workforce each year from 2007 to 2023, and the predicted number entering the workforce from 2024 to 2028. On average, 55 newly qualified Clinical Scientists are projected to join the Radiotherapy workforce per annum from 2024 to 2028.

A predictive model was created accounting for expected service expansion, projected number of Clinical Scientists joining the workforce, and predicted number of Clinical Scientists leaving the workforce. When these factors are accounted for, it is estimated that an annual injection of 66 Clinical Scientists is required to fill vacancies and allow for service expansion. This shortfall has increased since the 2021 census, and this likely reflects the large increase in resignations and retirements across the NHS since 2021[9].

To fill vacancies and meet IPEM recommended Clinical Scientist staffing provision, an annual injection of 75 Clinical Scientists is required between 2024 and 2026.

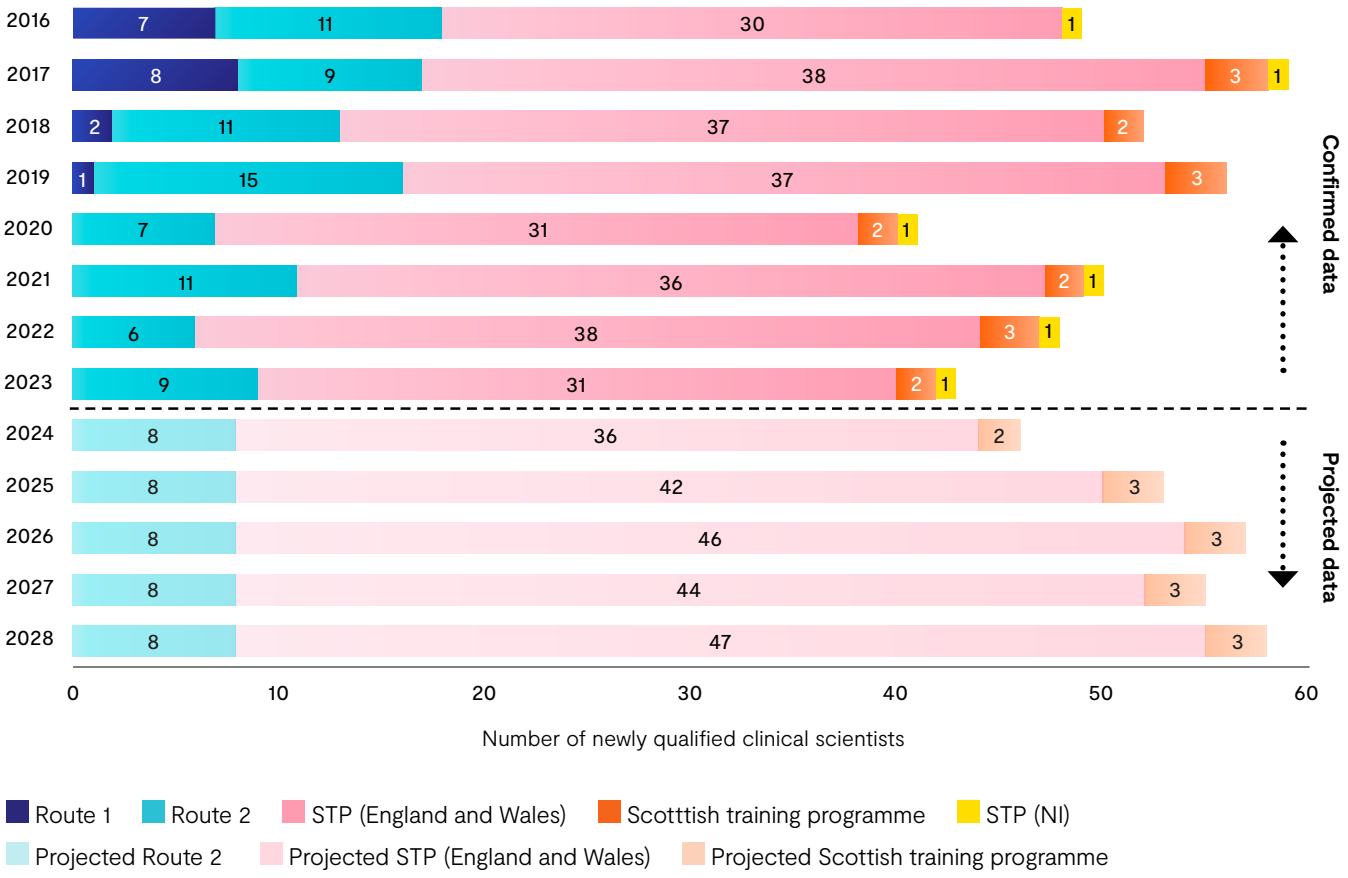



*Figure 19: Number of newly qualified Clinical Scientists entering the Radiotherapy workforce from 2016-2023 (confirmed) and 2024-2028 (predicted).*

# Clinical Technologists

Clinical Technologists in Physics and Engineering have vacancy rates of 7% and 9% respectively. As data for the number of Clinical Technologists entering the workforce is difficult to collect, an analogous prediction model to the one for Clinical Scientists has not been created. However, the numbers of Clinical Technologists required to fill current vacancies, and to meet IPEM staffing recommendations, are shown in Table 5.

| | Clinical Technologist requirement (WTE) | |
|---|---|---|
| **Staffing requirement** | **Physics** | **Engineering** |
| Meeting establishment | 46.6 | 30.8 |
| Meeting IPEM staffing recommendations | 177.5 | 119.3 |

*Table 5: Increase in WTE required for Clinical Technologists to meet establishment and IPEM staffing recommendations.*

**Clinical Technologists in Physics and Engineering have vacancy rates of 7% and 9% respectively.**

# Training Schemes

Increased training output is required to meet current staffing shortfalls for both Clinical Scientists and Clinical Technologists. Information on the training landscape may provide insight into how this might be achieved. Figures 20 and 21 show the number of responding centres offering different training routes for Clinical Scientists and Clinical Technologists.

Most respondents reported that their department supported the Scientist Training Programme (STP), or the Scottish Training Scheme (for respondents in Scotland). Approximately 50% of centres support Route 2 from the Association of Clinical Scientists, and a smaller number support the Academy of Healthcare Science's STP Equivalence, apprenticeships, and IPEM's Clinical Scientist Guided Training Scheme. Across all respondents, only two reported that they do not support any Clinical Scientist training.

In contrast with Clinical Scientist training, 31% of respondents reported that their department does not support any Clinical Technologist training schemes (N=19). Some of these respondents reported that their department was preparing to support Clinical Technologist trainees. An emergent theme from comments on training was a lack of funding to support training. Increased support for Clinical Technologist training is therefore urgently needed, particularly given the shortfall among Clinical Technologists in Engineering.

The most commonly supported Clinical Technologist training schemes are Healthcare Science Practitioner degree apprenticeships, IPEM's Technologist Training Scheme, and the Register of Clinical Technologist's Equivalence Route. A smaller number report supporting training through the Practitioner Training Programme, and engineering degree apprenticeships. Reports exist of dosimetrists training through undergraduate degrees in therapeutic radiography – which include clinical experience as part of the programme – and physics-based disciplines[10].

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**31%**

**of responding centres do not support any Clinical Technologist training schemes**

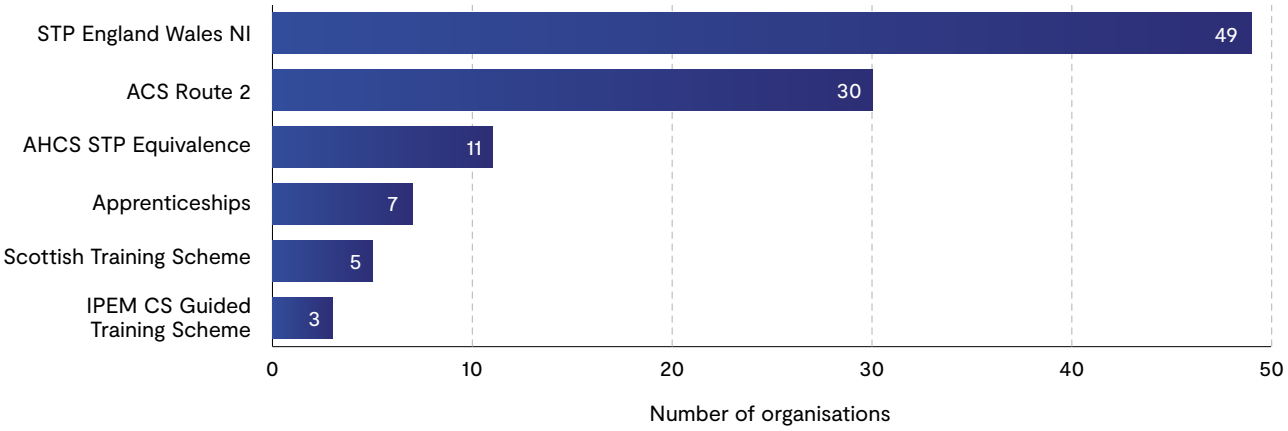



*Figure 20: Number of accredited training centres for each Clinical Scientist training route.*

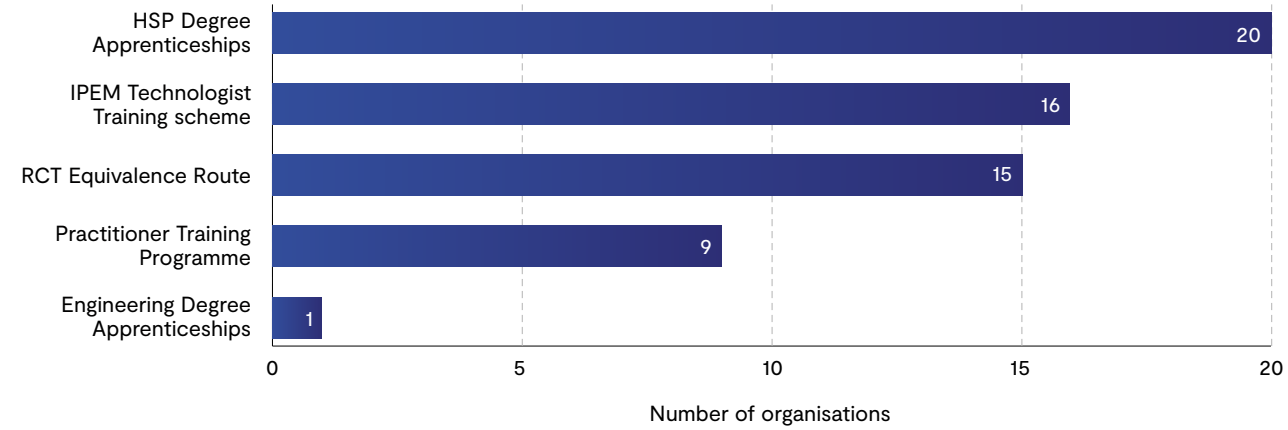



*Figure 21: Number of accredited training centres for each Clinical Technologist training route.*

# The Higher Specialist Scientist Register

The Higher Specialist Scientist Register (HSSR) was established in 2015 to provide a standard framework for CCS posts. This involved specifying job titles, job descriptions, length of service requirements, and pay banding for these roles. To this end, the HSSR provides professional recognition for medical physicists working at a similar level to medical consultants, and some employers now require applicants for new CCS posts to be on the HSSR.

In order to be on the HSSR, one must demonstrate clinical and scientific leadership, knowledge to support consultant-level clinical advice, and strategic direction and innovation supporting service development. There are two ways to achieve this. Higher Specialist Scientist Training (HSST) is a five-year qualification that covers higher specialist knowledge, research, and service management training. Higher Specialist Scientist Equivalence (HSSE) can be applied for when an individual can demonstrate attainment of the knowledge and skills taught on the HSST, through practical work experience. Clinical Scientists who achieve this demonstrate capability of working in roles at band 8b or above.

Nearly half of all respondents (N=29) indicated that they had staff either already on, or working towards, the HSSR. The largest proportion of these respondents were in London (N=6) and the East of England (N=5). Figure 22 shows a breakdown of these staff by registration status (working towards or achieved), and route to registration (HSST or HSSE). Twenty-eight staff are reportedly registered on HSSR, and 74 are currently working towards it, with HSST being the more widely used route to registration.

Currently, there are 10.2 WTE vacancies for Clinical Scientists at band 8b or above. (When only consultant posts are considered, i.e., those at band 8c and above, this figure lowers to 4.8.) The number of current and prospective HSSR registrants, relative to the number of vacancies, may be positive for the Radiotherapy workforce. It indicates that departments are planning for the future CCS workforce, and that future applicants to these posts will be competitive, possessing the required skills.

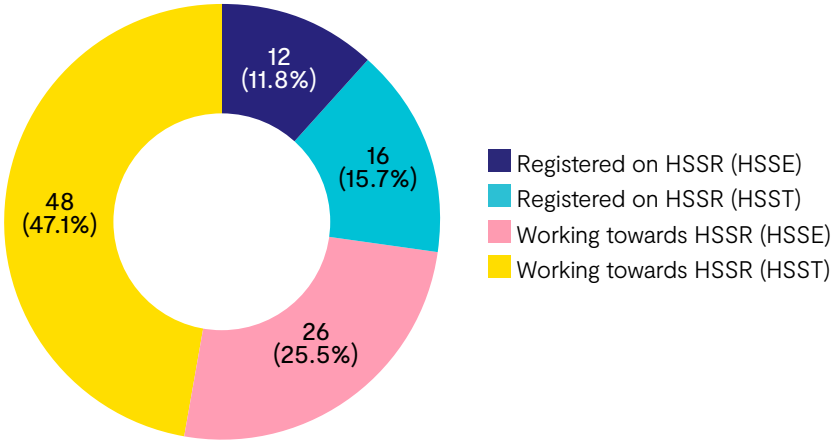



*Figure 22: Staff working towards or registered on the HSSR, broken down by route to registration.*

# Equipment

To assess the complexity and clinical capabilities of Radiotherapy departments in the UK, respondents were asked to provide information about equipment in their departments. Questions were asked regarding simulators, and linear accelerators (Linacs).

In total, 86 CT simulators (5 of which were MR simulators) and 308 Linacs were reported across all respondents. Radiotherapy departments have between 0 and 5 CT simulators, and between 1 and 16 Linacs. Information collected on each piece of equipment included make and model, age, and primary usage (whether clinical, research, teaching, or other).


"

**22%**

**of all reported Linacs are older than 10 years**

# Equipment Age

Across all reported Linacs, the average age is 6.3 years. Ages ranged from less than 1 year to 16 years. The presence of Linacs older than ten years may be a cause for concern, as this is typically the age at which they will need to be replaced. These Linacs accounted for approximately 22% of all reported Linacs (N=69) but were generally located in larger departments, with more Linacs. Figure 23 displays a histogram of all Linacs at each age.

The use of older Linacs in Radiotherapy departments may be related to lack of capacity for replacing them. This process is costly and involves a large time commitment for staff. To test this, a Pearson correlation was run between overall vacancy rates and average Linac age for each responding centre. A positive correlation approaching significance was found, $r(50) = 0.268$, $p = 0.057$.

The average age of all CT simulators is 4.3 years. Ages ranged from less than 1 year to 13 years. Like with Linacs, CT simulators that are ten years old or older likely need to be replaced. These accounted for approximately 11% of all CT simulators (N=9), and two of them were the only CT simulator available in a department. Unlike with Linacs, however, there was no significant correlation between overall vacancy rates and average CT simulator age. Figure 24 displays a histogram of all CT simulators at each age.

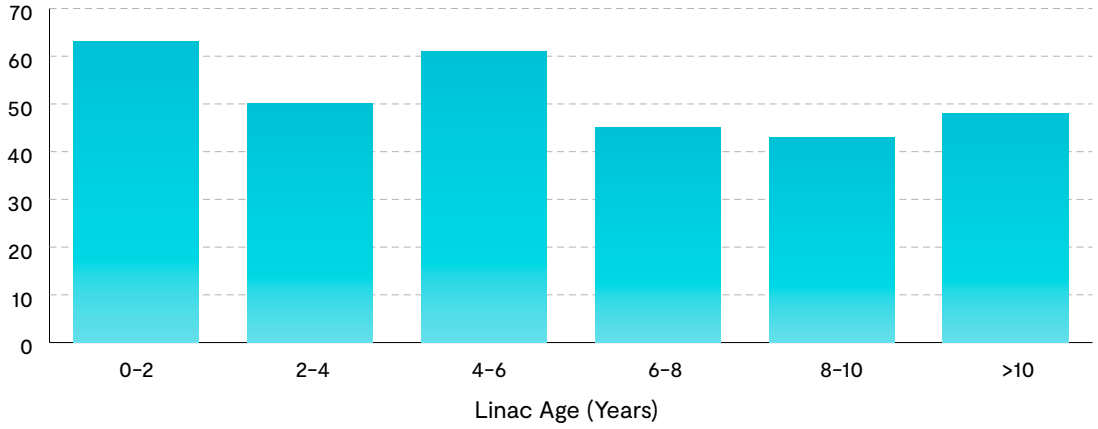



*Figure 23: A histogram showing average departmental Linac age across all responses.*

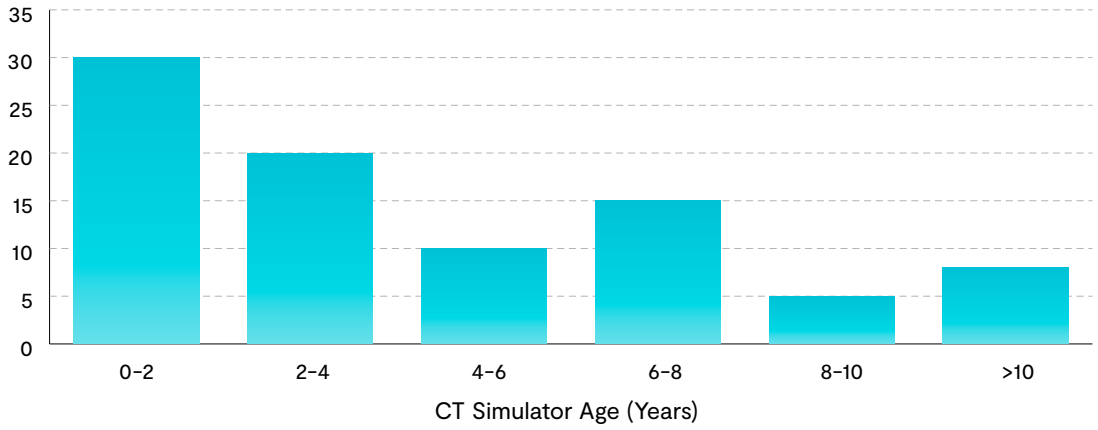



*Figure 24: A histogram showing the average departmental simulator age across all responses.*

# Equipment Usage

Out of all reported Linacs, excluding those that were being installed or decommissioned at the time of the survey (N=4), all but eight were solely for clinical use. Of the eight Linacs that were not solely clinical, five were for clinical and research use, two were for training purposes, and one was for back up only in a large department (9 Linacs).

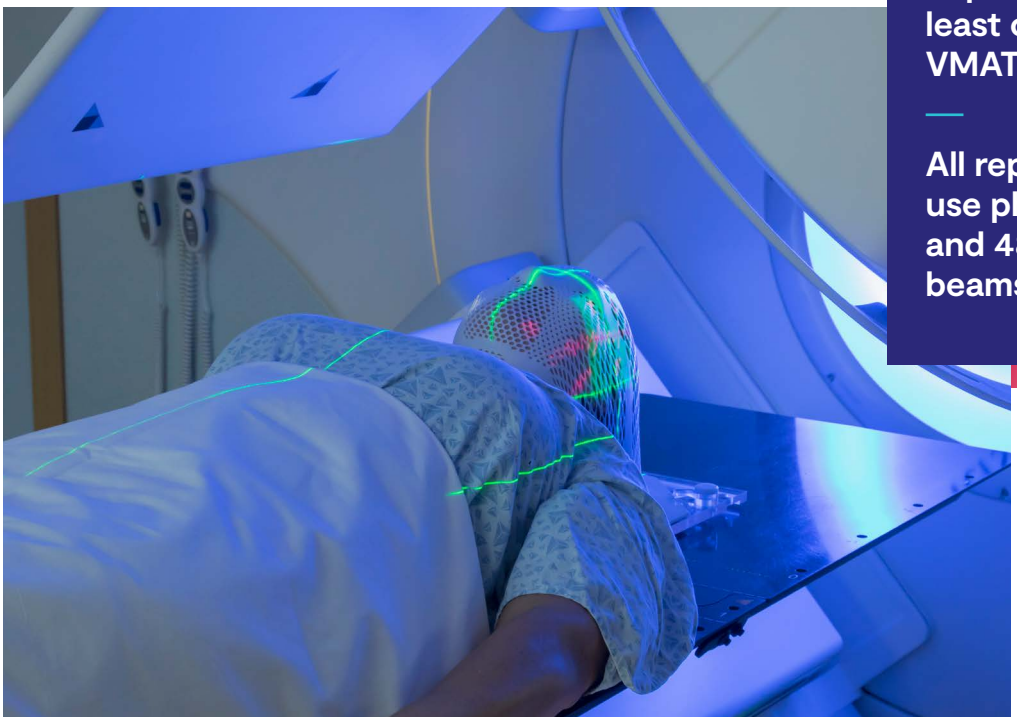
The Linacs used for clinical and research purposes were located in departments of varying sizes: one had a large establishment size but few Linacs, and two had smaller establishment sizes but comparatively many Linacs. This shows that only services with sufficient staffing or equipment provision are likely to be able to support research and development. Comments confirm that for many departments, current staffing levels cannot support research. Urgent action must be taken to support research in Radiotherapy, so that advances can be made in the provision of patient care. (Conversely, the Linacs used for training purposes only were both over 10 years of age, so likely unsuitable for clinical use.)

In addition to usage, some information was collected on Linac capabilities. All departments have at least one Linac with VMAT capabilities, and all but one have at least one with flattening filter free capabilities. All Linacs were reported to use photon beams, and approximately 48% use electron beams (N=135). All but three departments have at least one Linac with electron beam capabilities.

Nearly all CT simulators were for clinical use, except for two, which were for clinical and research use. These two CT simulators were located in large departments. This suggests that only departments with high staffing and equipment levels can currently support the use of CT simulators in research.

**All responding departments have at least one Linac with VMAT capabilities**

**All reported Linacs use photon beams, and 48% use electron beams**



# Recommendations

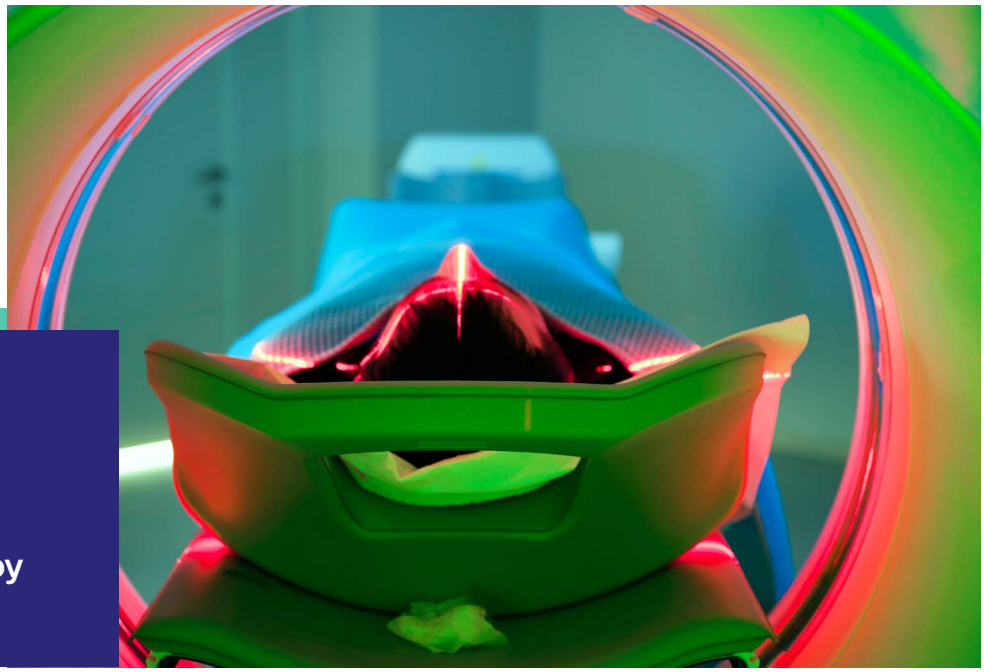
The results of the census depict a challenging climate for the Radiotherapy Physics workforce. Vacancies are unsustainably high at 8%. Beyond this, the current establishment falls short of staffing levels required to provide the full extent of services, by the assessment of census respondents and of IPEM staffing recommendations alike. Future workforce modelling suggests that current workforce needs will not be met within the next 3 years.

IPEM has produced the following recommendations in order to address the workforce shortage:

— **Increasing trainee output:**
  - Lobbying to influential institutions to increase funding for Trusts to create training posts
  - Increasing funding to commissioned training programmes
  - Improving awareness/communications regarding the career, as well as different training routes
  - Increasing support for local and regional methods of supporting training and service development, including but not limited to regional practice educators

— **Increasing support for career progression to enable an effective skill mix within the workforce**

— **Increasing "Other Staff" posts to ease pressures on Clinical Scientists and Clinical Technologists"**



**8%**

**average vacancy rate in Radiotherapy**

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