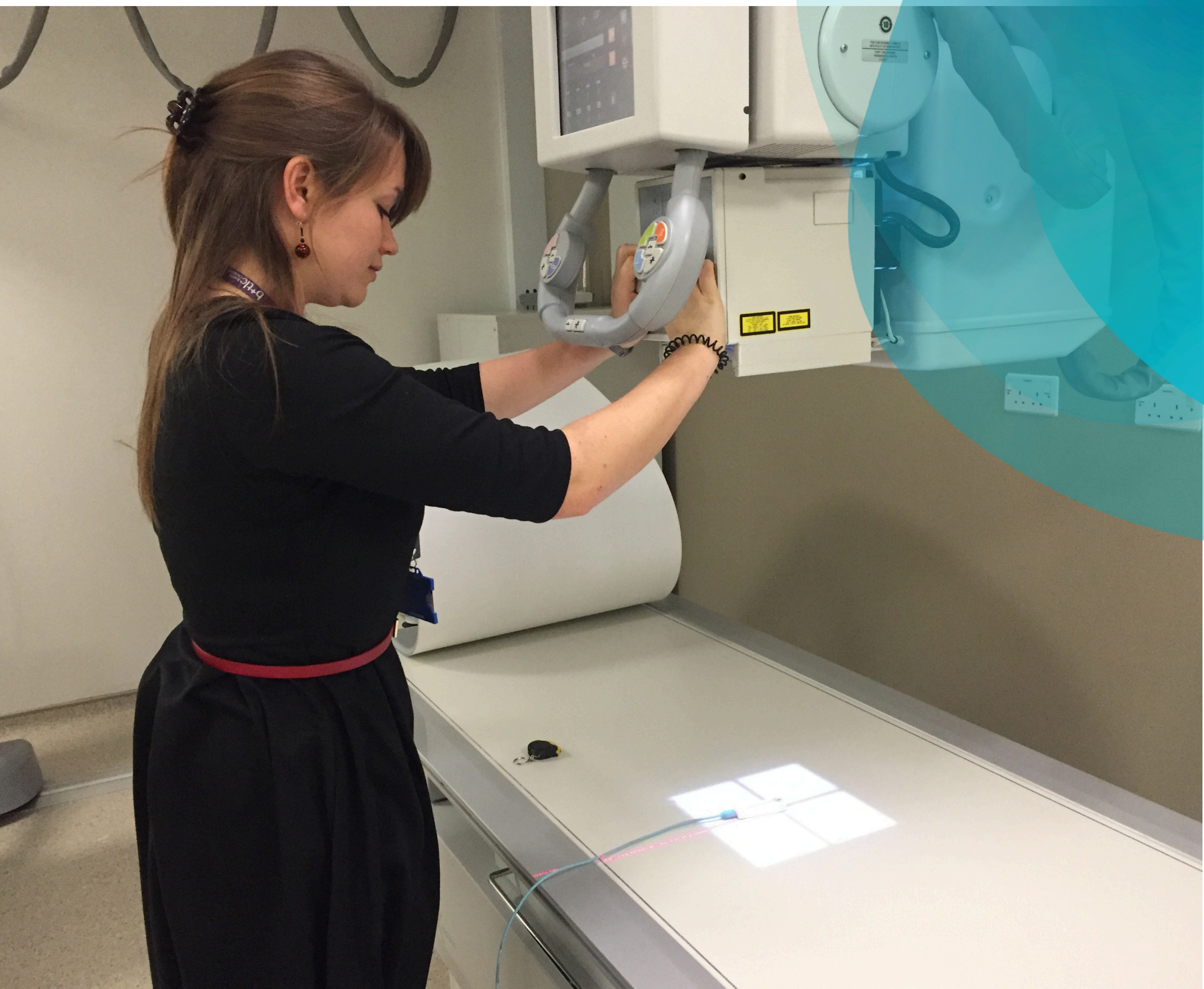
IPEM
Institute of Physics and Engineering in Medicine

Diagnostic Radiology and Radiation Protection

Workforce Census Report



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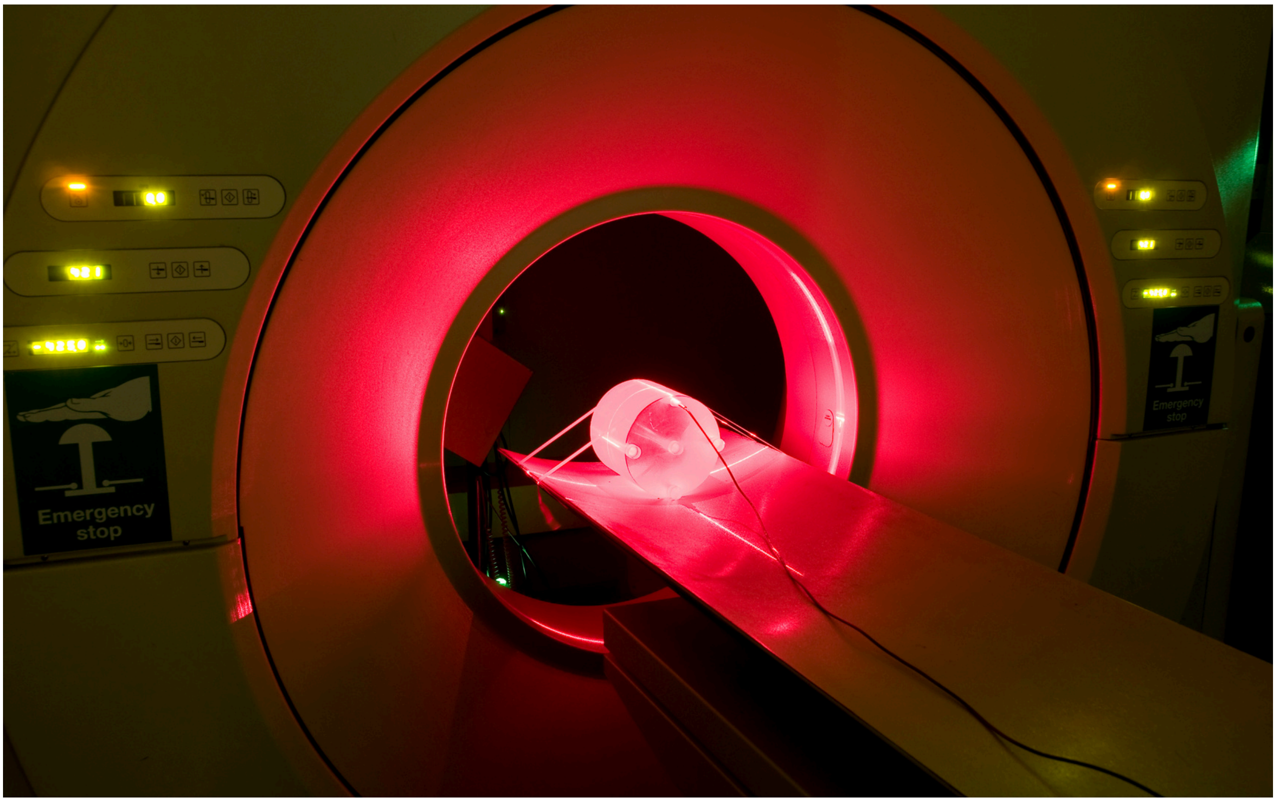
Key Statistics

- The number of Clinical Scientist and Clinical Technologist posts in WTE grew by an estimated 30% since the previous DR & RP workforce survey in 2021. We counted an increase from 461.8 to 598.8 whole time equivalent posts.
- The overall vacancy rate has increased from 9% to 15%.
- In order to meet recommended staffing levels overall, staffing must increase by 85% or 477.7 whole time equivalent posts. The number of staff with MPE certification must increase by 269% posts.
- 93% of centres report too few Clinical Scientists. 81% of centres report too few Clinical Technologists.
- 33 newly qualified Clinical Scientists per year are predicted to enter the DR & RP workforce over the next five years. This is not enough to fill existing vacancies, achieve recommended staffing levels, and account for the government's pledge to double the number of scanners in the NHS.



Recommendations

Diagnostic Radiology and Radiation Protection services in the UK are experiencing long-standing, critical workforce shortages. This has wide-reaching implications for the safety of patients, healthcare staff, and the public.

We recommend the following actions to the government, the NHS, and IPEM to address the workforce crisis.

1. Invest in training for DR & RP staff.

- **The government** should provide further funding to NHS Trusts, in support of DR & RP training. Funding should cover all available training routes for different staff groups and at a range of staff grades, to support a diverse workforce. This forms a routine ask that IPEM puts to the government as part of its public affairs activity, and is included in IPEM's Manifesto for the Future of Medical Physics and Clinical Engineering[1].
- **The NHS across devolved administrations** should increase support for regional training solutions. This will allow the profession to take advantage of economies of scale, and work towards standardisation of training.
    - Regional practice educators and local training leads have been employed to good effect, but these roles can be difficult to recruit to. As an alternative, IPEM suggests the inclusion of regional training provision duties within most existing, permanent job roles. It is in the interests of the profession for all staff to be invested in training.
- **Trusts** should ensure that they have training plans in place for DR & RP to meet minimum staffing levels and for future workforce needs. This should involve a review of existing establishment vs recommendations; planning trainee intake over an extended period of time (e.g., 5 years); maximising trainee intake; and planning to create qualified posts for individuals that complete training.
- **IPEM** may consider developing their own staffing recommendations, specific to DR & RP provision in the UK. Existing recommendations apply to the EU more generally, in which DR & RP operates differently.

Recommendations

2. Promote the development of existing staff.

- **The government** should recognise that high vacancy rates mean that there are not enough qualified staff in DR & RP. In addition, it takes several years to produce more qualified staff. This has been accounted for in the NHS Long Term Workforce Plan[2]; future activity must also account for this.
- **IPEM** should engage with RPA2000 to work towards streamlining the process of obtaining expert certification (e.g., MPE, RPA). This will include supporting RPA2000 to ensure that they have enough assessors.
- **Trusts** should include protected time for non-clinical activity in all job roles. This will enable staff to engage in training and research activity, which is critical to the future of the profession. Protected time for non-clinical activity should be accounted for in all future workforce planning.
- **IPEM** should work towards standardising the role of the Clinical Technologist in DR & RP. A standard framework for the role will aid centres in skill mix, delegation of duties, and workforce planning.
- **IPEM** should continue to support career progression and advanced practice for Clinical Technologists. We have begun this work with the release of a career roadmap[3]. Plans to continue this work are underway, such as through the development of example job descriptions for Clinical Technologists in advanced practice.

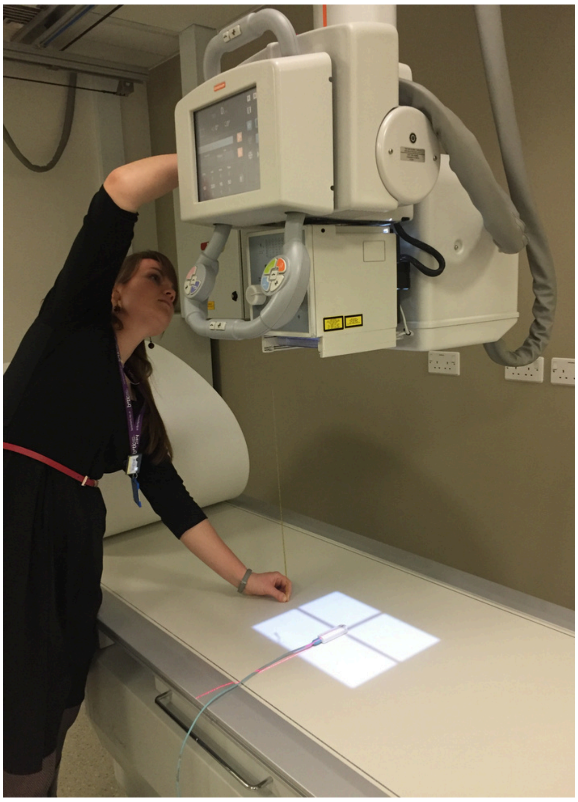
3. Explore strategic workforce solutions within individual centres.

- **Heads of Department** should explore ways to effectively use “Other” clinical roles to promote skill mix and improve efficiency. Some activities, such as programming, could be undertaken by staff who are pre-registration. Administrative support for medical physics service delivery can also release staff to deliver scientific and technical services.
- **Trusts** should prioritise implementing measures to promote staff wellbeing. This would improve the effectiveness of the workforce, and support retention. Methods to do this may include investing in up-to-date infrastructure, and empowering managers to foster a supportive working culture.
    - Flexible working should be included among these wellbeing measures. IPEM encourages DR & RP centres to support flexible working, as this would encourage the retention of older and more experienced staff.

Survey Methodology

The Institute of Physics and Engineering in Medicine (IPEM) carried out a survey of the Diagnostic Radiology and Radiation Protection (DR & RP) workforce in May and June 2024. All Heads of DR & RP services in the UK, either NHS or Independent, were invited to respond. **We achieved a 90% response rate,** covering 62 centres and 98% of all NHS services.

The survey covered Clinical Scientists and Technologists, as well as administrative and other clinical staff. Data was also collected on staff with certificates of professional competency, including Medical Physics Expert (MPE), Radiation Protection Advisor (RPA), Radiation Waste Advisor (RWA), Laser Protection Advisor (LPA), and Magnetic Resonance Safety Expert (MRSE).



Much of the administrative establishment provides support for other Medical Physics departments outside of DR & RP. They may also provide support in areas such as dosimetry, governance, training, or contracts and quality support.

Staff in the Other Staff category include:

- Pre-registration Clinical Scientists/ Clinical Technologists (e.g., Assistant or Associate roles)
- Bank Clinical Scientists
- Radiographers
- Computer Scientists
- Strategic roles such as business/quality managers, trials co-ordinators, non-Clinical Scientists who may act as an RPA/RWA

Establishment and Vacancy Rates

Current establishment information is shown in Table 1. We counted 566 Clinical Scientists and Clinical Technologists (headcount) currently working in DR & RP in the UK.

The establishment of Clinical Scientists and Clinical Technologists has expanded by 30% since the DR & RP survey in 2021. This reflects an average yearly increase of 45.7 WTE across both professional groups.

However, this growth is accompanied by an **increase in vacancies by more than double the number seen in 2021,** from 39.9 WTE to 92.5 WTE in three years. The large majority of the new establishment and vacancies is made up of Clinical Scientist posts.

Profession	Measured Establishment WTE	Estimated Establishment WTE	In Post WTE	Vacancies WTE	Vacancy Rate
Clinical Scientists	436.0	452.8	364.5	71.5	16%
Clinical Technologists	162.8	167.6	141.8	21.0	13%
Other Staff - Clinical	35.4	35.4	31.0	4.4	12%
Other Staff - Admin	38.8	38.8	36.4	2.4	6%
Total	**673.0**	**694.6**	**573.7**	**99.3**	**15%**

Table 1: The number of established posts, staff in posts, and vacant posts, listed in WTE, for each of the professions surveyed. Vacancy rates are listed.

The number of times that posts were unsuccessfully filled following advertisement has increased dramatically since the previous survey, from a total of 37 in 2021 to 96 in 2024. Two thirds of all unsuccessfully advertised posts were for Clinical Scientist roles at bands 7 and 8a. If there is difficulty in recruiting to a post, the risk of post being removed from department budgets is introduced.

This likely reflects that the establishment has expanded to address the workforce shortage in DR & RP. However, these newly added posts are often remaining vacant because there are not enough experienced staff to fill them.

Vacancy rates in DR & RP are higher than in other Medical Physics specialisms. However, unsustainably high vacancy rates are present across specialisms. The Radiotherapy vacancy rate is 8%, and the Nuclear Medicine vacancy rate is estimated at 12%. An increase in training is required across all of Medical Physics; workforce pressures should not be addressed by diverting trainees away from other disciplines.

In the context of high vacancy rates, some centres ease workforce pressures by creating different types of posts. For instance, **60% of centres have dedicated admin support (N=37). These roles support managerial functions, department admin, minute taking, invoicing, contract support etc.** This support enables Clinical Scientists and Technologists to dedicate more time to complex scientific and technical work, and centres should be encouraged to utilise this where possible.

Workforce Composition and Skill Mix

Understanding the composition of the DR & RP workforce may help to answer questions around achieving an effective skill mix. The two main professional groups that were surveyed include Clinical Scientists and Clinical Technologists. The remit of each professional group is different. Clinical Scientists develop policies and procedures for radiation safety, oversee quality assurance of equipment, and engage in research and service development. Clinical Technologists typically follow existing procedures and deliver quality control tests. Nationally, there are some senior technologist roles that overlap the role of the clinical scientist in several areas.

Figure 1 shows the relative proportion of Clinical Scientists and Clinical Technologists in each UK region. An estimated 65% of the establishment overall, including vacancies, consists of Clinical Scientist posts. Across the UK regions, the proportion of Clinical Scientist posts ranges from 62% in Wales to 85% in London. Respondent comments in the section on staffing provision highlighted the risks associated with a Clinical Technologist establishment that is too small. Clinical Technologists may be under-utilised, particularly if many of them feel that the only way to progress is by becoming a Clinical Scientist. This may introduce inefficiencies into the DR & RP workforce, if Clinical Scientists must complete tasks that can be done by Clinical Technologists.

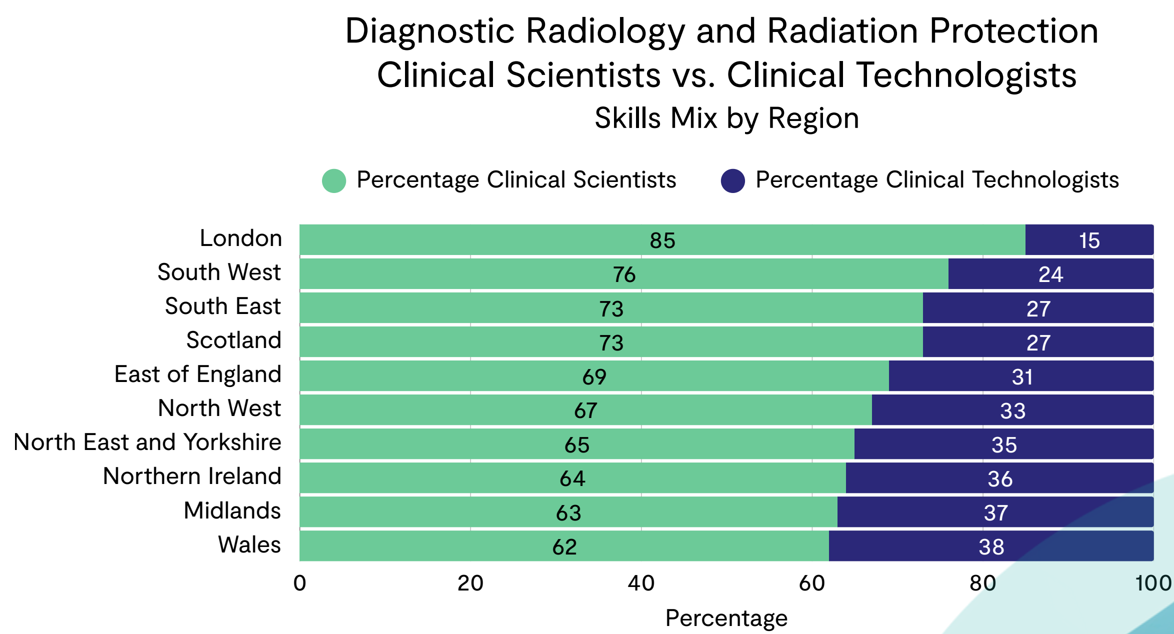


Figure 1: Relative proportions of Clinical Scientists and Clinical Technologists in each UK region.

The relative proportion of Clinical Scientists and Clinical Technologists may give some indication about the skill mix within a centre's workforce. Establishment composition varies with respect to department size. Figure 2 plots each responding centre, ranked by relative size, against the proportion of Clinical Scientists employed relative to Clinical Technologists. Smaller departments are more variable in their workforce composition than larger departments. For mid to large sized medical physics services, technologists typically account for 30-40% of the workforce.

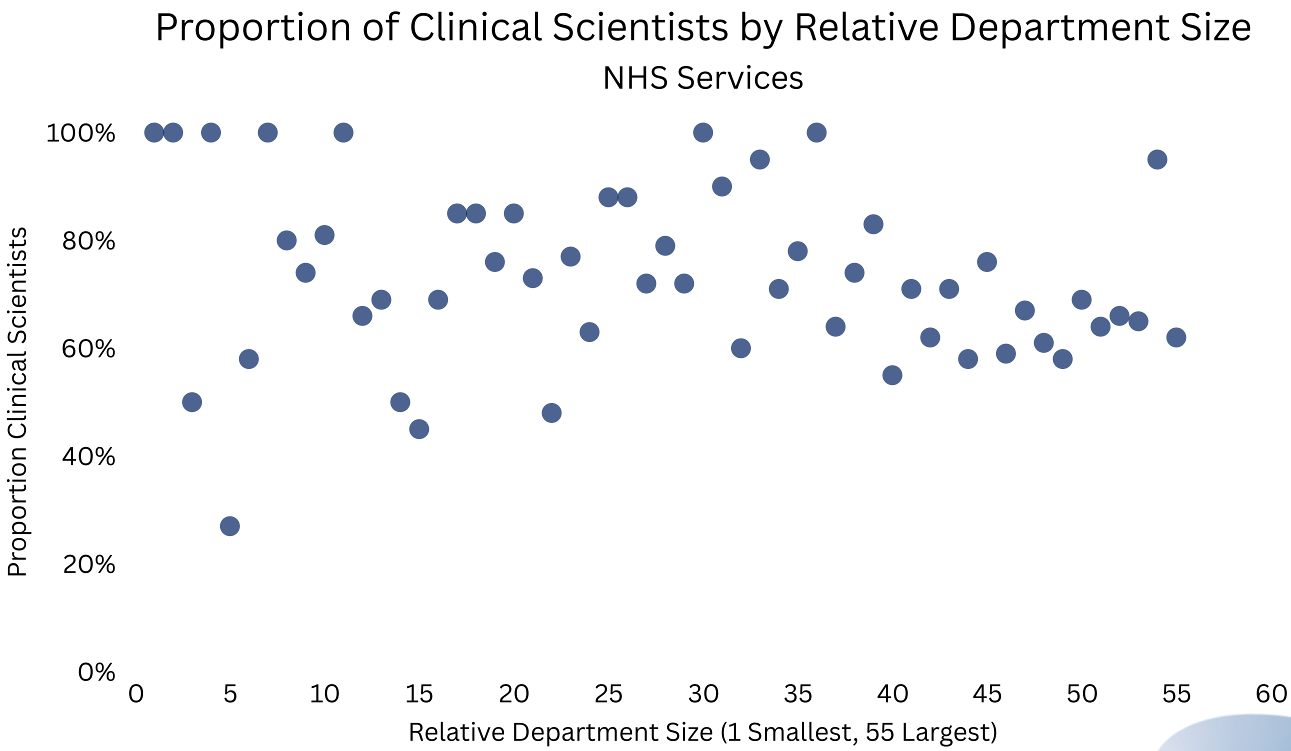


Figure 2: Relative proportions of Clinical Scientists and Clinical Technologists in each responding service, ranked by relative size.

Desirable and Recommended Staffing Levels

In order to assess the true needs of the workforce, it is important to understand the staffing levels that would be required to run safe and effective DR & RP services.

There are two documents that are widely used in the UK, which provide recommendations for staffing levels in DR & RP. These are the EU Report 174[4] and the European Federation for Organisations of Medical Physics (EFOMP) report[5]. The former provides recommendations for levels of overall Medical Physics support, and MPE support. The latter provides recommendations for levels of Medical Physics staffing at band 7 and above. The EFOMP staffing recommendations concern staff with qualification at EQF level 7 and above. For the purposes of this report, this has been equated to band 7 i.e. qualified clinical scientist or senior technologist. The EFOMP report does not include staff below band 7. This may include trainee scientists, assistant physicist and technologist posts. In the 2021 survey a review of larger physics services with significant skill mix calculated that staff below band 7 accounted for typically 40% of an overall physics service. Once this factor is applied to the EFOMP recommendation of 746.2 posts, the recommended overall medical physics service is 1044.7 WTE, similar to the figure from report 174. Recommendations are provided based on the volume of equipment, patient activity, staff dosimetry, research, training and department specific factors.

Fifty-six centres responded with information on the recommended staffing levels for their centres, per the available reports. Centres also stated the staffing levels that they felt were **desirable** to run an optimal service. This can be compared with staffing recommendations to test their validity.

Current vs. Recommended Staffing

Table 2 shows a comparison of the current numbers of staff in post WTE, with recommended staffing levels per the available reports. Only data from centres who responded with information on recommended staffing levels are shown.

Recommended staffing levels have increased since the previous survey in 2021. This can be explained by the substantial expansion of imaging equipment within the NHS in recent years including the roll out of community diagnostic centres. **According to published recommendations, the DR & RP workforce overall would need to expand by 85% in order to provide optimal services. In addition, the number of MPEs should expand by 269%.**

Metric	EU Report 174 Medical Physics Service	EU Report 174 MPE	EFOMP Medical Physics Support Band 7 and above
Current WTE	564.6	110.9	428.7
Recommended WTE	1042.3	409.0	746.2
Required WTE Increase	477.7	298.1	317.5
Required Increase to Meet Recommended (%)	**85%**	**269%**	**74%**

Table 2: Current numbers of staff in post across all professional groups, compared with the staffing recommendations from EU Report 174 and EFOMP.

Figure 3 shows the proportion of DR & RP centres with establishment sizes (including vacancies) that are over, under, or equal to the recommendations for the three staffing categories. Approximately 13% of centres indicated establishment sizes equal to or above recommendations for Medical Physics support overall; 14% indicated establishment sizes above recommendations for Medical Physics staff at band 7 or above. The number of centres with an establishment that meets or exceeds recommended MPE provision is smaller at 6%.

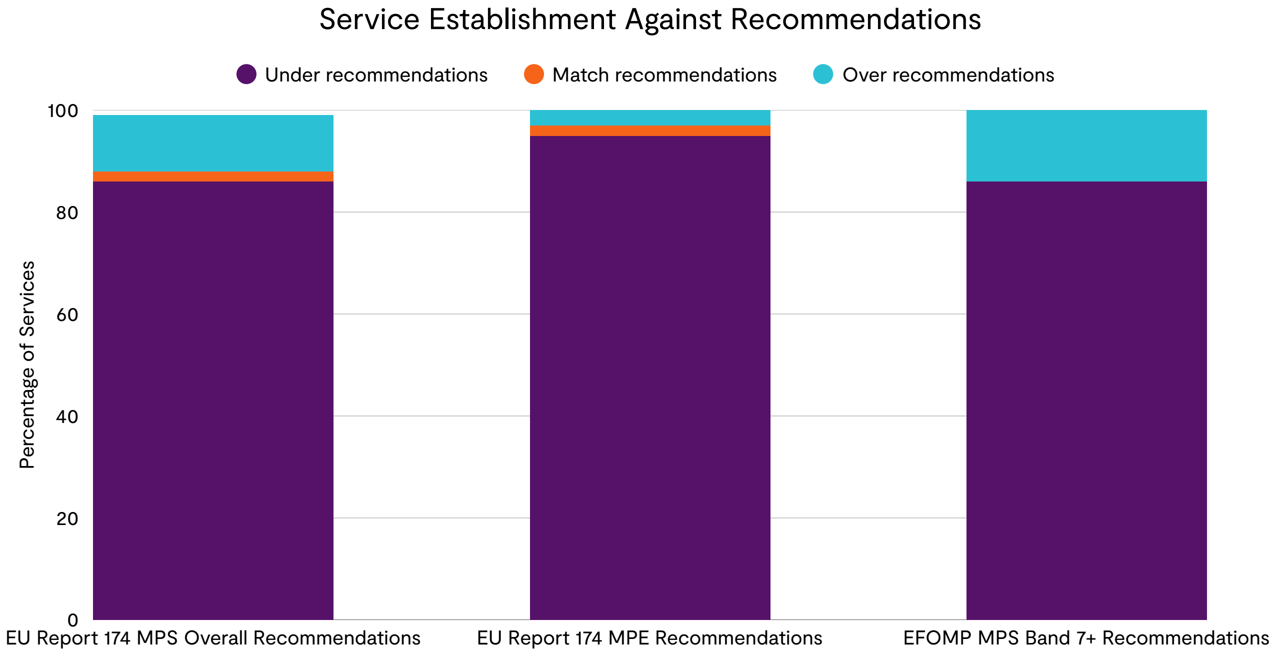


Figure 3: The proportion of services where the establishment is below, equivalent to, or above the three available sets of recommendations.

The shortfall of staffing levels relative to recommendations is seen to vary by region. Every UK region is under the recommended staffing level for each set of recommendations. By number of staff WTE, the largest shortfalls are seen in London and the Southeast for all staff groups. By proportion, two regions stand out with respect to MPE staffing. Northern Ireland has 14% of the recommended MPE provision, and the North East and Yorkshire has 19% of the recommended MPE provision. There are no UK regions with more than 43% of the recommended number of MPEs.

Figure 4 shows how the establishment sizes of individual NHS services compare with the three available sets of recommendations. Individual DR & RP services, ranked by relative size, are plotted against their staffing levels as a percentage of recommendations for overall staffing (EU Report 174), MPE staffing (EU Report 174), and experienced staff at band 7 or above (EFOMP).

The trends for comparison of staffing levels to each set of recommendations are similar. **As departments become larger, their staffing levels fall further short of the recommendations.** The largest department has approximately 31% of recommended staffing levels across the three sets of recommendations. **Additionally, smaller departments vary more widely in how their establishment sizes compare with staffing recommendations.** A likely explanation is that variability in service models is more pronounced in small departments. Furthermore, larger, regional models have some efficiencies that allow them to take advantage of economies of scale. This demonstrates why staffing recommendations should not be treated with a “one size fits all” approach.

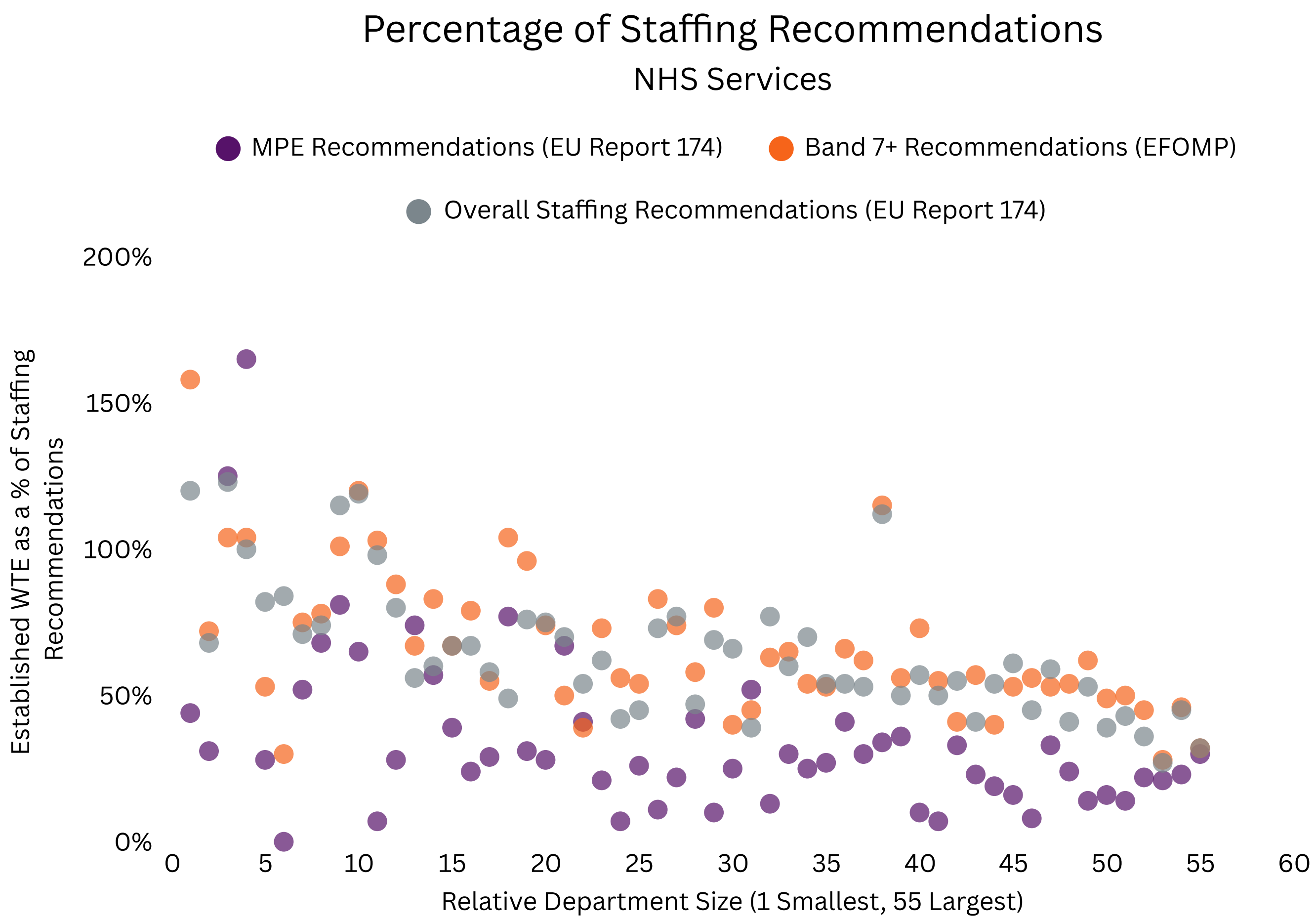


Figure 4: NHS services, ranked by relative size, against percentage of staffing provision relative to the three sets of recommendations.

The results show multiple dimensions to the DR & RP workforce shortage. The existing establishment in the majority of centres is insufficient to meet recommendations. Additionally, the high vacancy rates indicate difficulty in filling established posts. Addressing this will require a multi-faceted approach, covering expansion of the establishment, training of new staff, and professional development of existing staff. Strategic solutions involving other staff groups should be explored in the interim.

A shortage of MPEs has also been found in other Medical Physics disciplines[6,7]. This is likely related to the process of obtaining MPE registration, which can be complex and lengthy. Streamlining the process of obtaining registration, and allocating greater resource towards expert registration, will work towards improving this shortage.

Desirable Staffing and Calculator Validation

Respondents were asked to indicate the number of staff, at each AfC band, that they felt were desirable for running safe and effective services. This is shown in Table 3.

Band	Clinical Scientists		Clinical Technologists	
	Current	Desirable	Current	Desirable
Band 4	0.0	0.0	7.0	13.0
Band 5	0.0	0.0	41.9	77.5
Band 6	0.0	0.0	50.8	102.4
Band 7	81.4	193.7	28.7	50.8
Band 8a	100.3	177.3	10.4	17.8
Band 8b	69.3	99.6	2.0	2.0
Band 8c	40.4	61.3	0.0	0.0
Band 8d	30.2	41.8	0.0	0.0
Band 9	0.1	1.0	0.0	0.0
Total	**321.7**	**574.7**	**140.8**	**263.5**

Table 3: Current numbers of Clinical Scientists and Clinical Technologists WTE in post, compared with desirable staffing WTE, stratified by AfC band. Figures for independent centres are excluded. Although the overall establishment includes some Clinical Scientist posts below band 7, they are excluded here.

The number of Clinical Scientists and Clinical Technologists currently in post is approximately 55% of total desirable staffing levels. This is similar to the comparison of the current number of staff WTE in post, and the recommended total level of Medical Physics support (54%).

The comparison of current and desirable staffing levels varies by region. No region indicated that their current staffing levels meet the desirable amount. Wales indicated that an increase in Clinical Scientist posts by 81% would be desirable. Meanwhile, the Southeast and Southwest indicated that to achieve the desirable number of Clinical Technologists, the establishment should double in size.

There exist multiple certificates of professional competency that are relevant to the provision of DR & RP services, although published staffing recommendations are only available for MPEs. Respondents were asked to state the current and desirable number of staff WTE with the following certifications: MPE, RPA, RWA, and LPA. The results are shown in Figure 4. Substantial shortages of staff with each certification are shown, although staffing requirements vary by certification.

To examine the validity of the staffing recommendations more closely, the desirable and recommended staffing levels for each department were compared. Only Clinical Scientists and Clinical Technologists were counted. In order for the data to fit the assumption of normality, logarithmic transformations were applied.

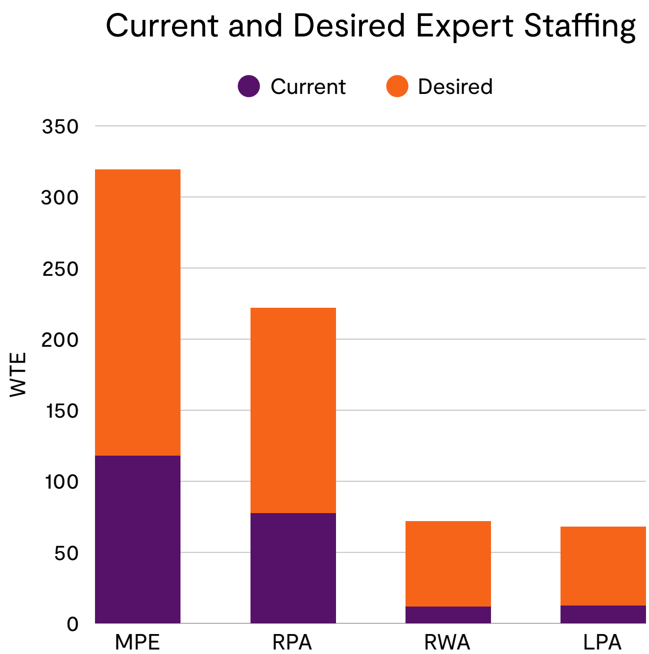


Figure 4: The current and desired number in WTE of staff with different expert certifications.

The following Pearson correlations were performed, all of which were positive and highly significant: desirable staffing overall vs. recommended medical physics support (EU Report 174), $r(54) = 0.921$, $p < 0.001$; desirable number of MPEs vs. recommended MPE support (EU report 174), $r(53) = 0.873$, $p < 0.001$; desirable number of staff over band 7 vs. recommended number of staff over band 7 (EFOMP), $r(54) = 0.859$, $p < 0.001$.

It should be noted, however, that there is a large difference between the figures for desirable and recommended staffing levels. EU Report 174 recommends 1042.3 WTE staff overall, while respondents stated that a desirable level would be 838.2 WTE staff overall. The EFOMP guidelines recommend a total of 746.2 WTE staff at band 7 or above, whereas the stated desirable level is 645.3 WTE staff.

The correlation between desirable and recommended staffing levels suggests that DR & RP centres use similar criteria to the available staffing recommendations to assess desirable staffing levels. However, existing staffing recommendations provide figures that are substantially higher than stated desirable staffing levels.

The observed differences in median desirable and recommended staffing levels may be caused by the exclusion of staff in the Other and Admin categories, who fulfil vital roles in service delivery. One finding that supports this notion is that the proportion of current staff WTE to desirable staff WTE, is similar to the proportion of current staff WTE to recommended staff WTE.

Anecdotal evidence suggests that managers and decision makers may consider the recommendations provided by EFOMP and EU Report 174 to be unrealistic. They can be far higher than the current numbers of staff that a centre employs. However, their apparent alignment with desirable staffing levels indicate that they provide a reasonable estimate of what the DR & RP workforce requires to deliver safe and effective services.

It should be noted that EU Report 174 and the EFOMP document were developed for use across the EU. To support the case for increased staffing in times of limited resources, the development of a staffing calculator developed specifically for use in the UK may be helpful to the production of business cases.

Considerations for Model Development

Respondents were asked to state what should be considered when developing a staffing calculator for DR & RP. The most frequently raised factors were as follows:

- *Geography*: This encompasses geographical location, as well as the size of the population served. A Trust's location will influence staff travel time between sites (especially if in a remote area). Areas with a high cost of living may have difficulty attracting staff.
- *Equipment*: The amount and complexity of equipment will affect the amount of staff time needed for maintenance and calibration. Respondents frequently stated that complex equipment can incur a significant time burden, for training staff in its use and performing safety tests and optimisation.
- *Service development*: This was raised as a distinct concept from research, and refers to the time and expertise required to integrate new technologies into routine service delivery.
- *Legal regulations (e.g., IR(ME)R, IRR, EPR, AORD)*: These evolve and become increasingly complex over time, and require ongoing work to ensure compliance. Legal regulations encompass equipment quality assurance requirements, governance, and expert services (i.e., provision of MPE/RPA/RWA services).

Other factors for consideration were also mentioned, including:

- Clinical and patient factors (i.e., type and complexity of cases)
- Training burden
- Department size and structure
- External contracts
- Participation in national initiatives (e.g., IPEM SIGs)

Staffing Provision

We sought to measure the impact of staffing levels, vacancy rates, shortfall from recommendations, and workforce composition on service delivery. Respondents were asked to indicate how satisfied they were with staffing provision at their centres.

Respondents were asked to indicate whether their staffing provision for Clinical Scientists and Clinical Technologists was too much, sufficient, too little, or far too little. Figure 6 shows the breakdown of responses for each professional group.

A high proportion of centres indicated insufficient staffing: 19% of centres indicated sufficient Clinical Technologists, and just 7% indicated sufficient Clinical Scientists. These numbers are consistent with the extent of staffing shortfall seen in the high vacancy rates, and shortfall from recommended staffing levels.

Further comments on staffing provision satisfaction could be broken down into the following themes: skill mix and burden of training; research and service development; low funding levels; workforce resilience. Some comments highlighted issues that are specific to Clinical Technologists.

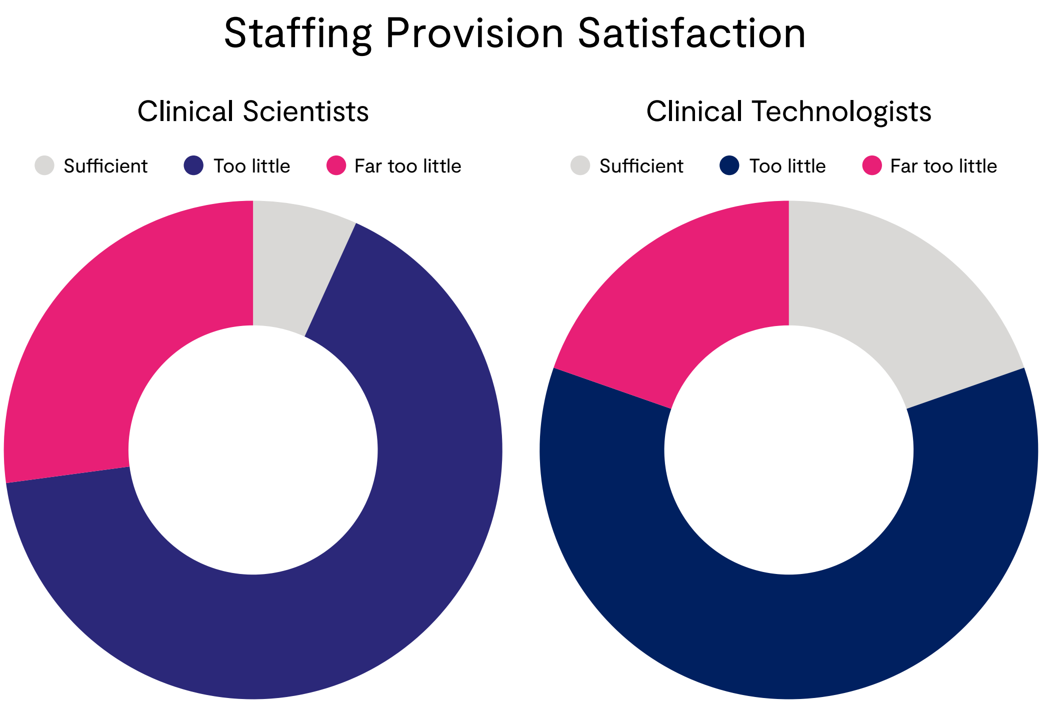


Figure 6: A breakdown of responses on staffing provision satisfaction for Clinical Scientists and Clinical Technologists.

Staffing Provision Satisfaction Further Comments

Skill Mix and Burden of Training

Posts for qualified DR & RP staff are challenging to recruit to. Some centres have advertised the same senior posts more than once, receiving no applications on some rounds. This has a detrimental impact on the skill mix of the workforce. A solution that many centres pursue is to recruit staff at a lower band, and train them in-house to fill their staffing needs. However, this puts a heavy training burden on senior, expert staff.

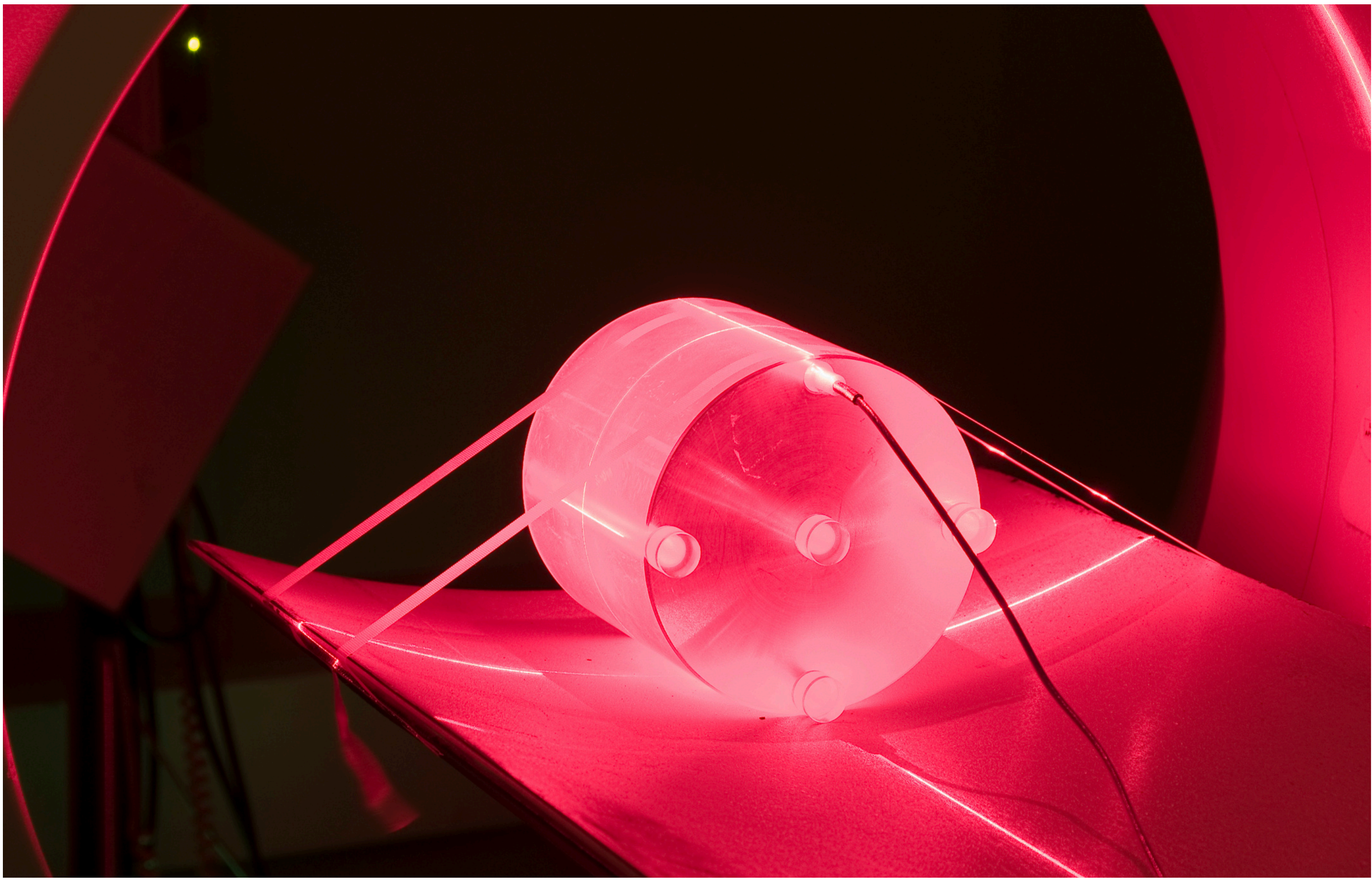
“Main challenge is in recruiting qualified staff. Most vacancies are filled by trainees and capacity to deliver training is a significant challenge.”

Similar difficulties are reported among staff above the newly-qualified level. Working towards expert qualifications (e.g., MPE, RPA, RWA, LPA) experience an additional training burden, as this process is lengthy and complex. This is compounded by the number of expert registrations that are required in DR & RP, in comparison with other Medical Physics specialisms. Some respondents reported that this can deter staff from working towards these certifications. The effect of this is that there is a paucity of expert staff, which creates concerns of workforce resilience.

In some cases, however, centres have found advantages in employing staff at lower bands.

“We have since focused on recruiting at Band 5 which we have more success with… and "growing our own". These posts have programming skills which have a high impact on streamlining what our team can achieve with limited resources”

Where centres have difficulty in recruiting at higher bands, considering the skills that staff at lower bands may have could improve efficiency and help to ease workforce pressures. They may also provide a future pipeline for qualified Clinical Scientists and Clinical Technologists. Out of 59 responding centres using AfC bandings, 22 employ no Clinical Scientists below band 7, and no Clinical Technologists or other clinical staff below band 6. We encourage exploration of roles at lower bands to promote an effective skill mix.



Research and Service Development

Service development involves integrating new technologies and techniques into routine service delivery. Research refers to the discovery and testing of novel methods. While they are distinct concepts, both should be considered key components of medical physics service delivery.

Both service development and research are impacted by reduced staffing provision. Many centres report no capacity for these activities, as routine clinical work must be prioritised. The impacts of this lack of capacity are wide-reaching. Novel techniques and technology continue to develop and increase in complexity, and centres struggle to implement these without the required capacity. This will negatively impact service efficiency in the long term. These long-term implications will be evident to some staff: this may impact staff morale.

The lack of service development and research capacity within medical physics has an impact on patient facing clinical services. Implementation of new technologies such as AI image evaluation, new detector technologies and spectral imaging and service development for optimisation, improving radiation safety governance or quality accreditation are all impacted by a shortfall in the medical physics workforce

Respondents suggest that protected time for research and development should be factored into service configuration. Some suggest that as much as 20% of all staff time should ideally be protected for research and development. While capacity is limited currently, this represents a goal for the discipline to work towards.

Low Funding Levels

Many Trusts continue to experience financial difficulties, which directly impact DR & RP services.

Low funding limits the ability of some DR & RP centres to be competitive on the job market, despite nationally agreed job profiles within the NHS. For instance, even where a centre has the funds to advertise for a post, another organisation may be able to advertise for a post with the same requirements, at a higher salary. Other organisations may include those outside the UK. This leads to difficulties with retention and competition from other organisations.

"We have also experienced potential recruits pulling out as they are offered a higher band elsewhere and we have had to re-advertise."

Without the ability to recruit and retain skilled professionals, centres have continued difficulty expanding service provision to meet requirements within their organisation or to grow revenue through contracted services. This creates a "chicken and egg" scenario with respect to expansion that becomes increasingly difficult to address with time. Additional funding for posts would assist Trusts in this position to meet minimum staffing levels and have the capacity to deliver services to other organisations.

Workforce Resilience

Many centres are concerned about the resilience of their workforce to absences, in the present or future.

Service provision in the case of staff illness is likely to be negatively impacted. Finding cover for maternity leave was commented on by multiple respondents: this can be prohibitively difficult, to the extent that some services do not advertise for such posts even if they are needed. Retirement of staff – even when they are known and expected – present challenges even for centres that report sufficient staffing provision.

Many services operate with just one qualified expert (i.e. RPA, RWA, MPE). This model has no resilience to cover annual leave, sickness or retirement with insufficient succession planning. Workforce planning for DR & RP must consider resilience for expert roles.

Similar concerns around workforce resilience have been reported in other specialisms of Medical Physics. **Any workforce planning for DR & RP must account for workforce resilience, even in cases where centres report sufficient staffing provision.**

Comments Specific to Clinical Technologists

Respondents expressed concern over attrition for Clinical Technologists, especially as they progress through their career. Many Clinical Technologists feel that opportunities for career progression are limited, and so choose to undertake Clinical Scientist training to attain more senior roles. Respondents who provided further details about their staff identified a number of Clinical Technologists, trainee or otherwise, who planned to undertake Clinical Scientist training in the near future.

In some centres, this is related to an urgent requirement to grow the Clinical Scientist workforce, to the detriment of the Clinical Technologist workforce.

“We've urgently needed clinical scientists to deliver regulatory services, so all investment has gone there. The value of technologists hasn't been adequately explored. There is also a need to exploit a technologist workforce in delivery of routine services, increase productivity and allowing clinical scientists to deliver service development, training and research.”

A standard framework for Clinical Technologists to work towards advanced practice has recently been published by IPEM[3]. This includes a roadmap to attaining professional qualifications through to FHEQ Level 8, and involves the development of job profiles for Clinical Technologists in advance practice. This may work to address the current difficulties in career progression specific to Clinical Technologists.

Ahead of the release of this framework, some centres have independently created senior Clinical Technologist roles. An example seen in the data is the Clinical Technologist Manager role. These staff can provide supervision and oversight into routine service delivery undertaken by other Clinical Technologists and newly qualified Clinical Scientists. Centres with concerns around skill mix, or Clinical Technologist retention, may explore the creation of similar roles to improve service delivery.

Activity

In addition to the population served, change in activity levels over time can show how workforce levels compare with service demand. Figure 7 shows how the number of CT scans, in millions, has changed in England over each six-month period for the last 5 years.

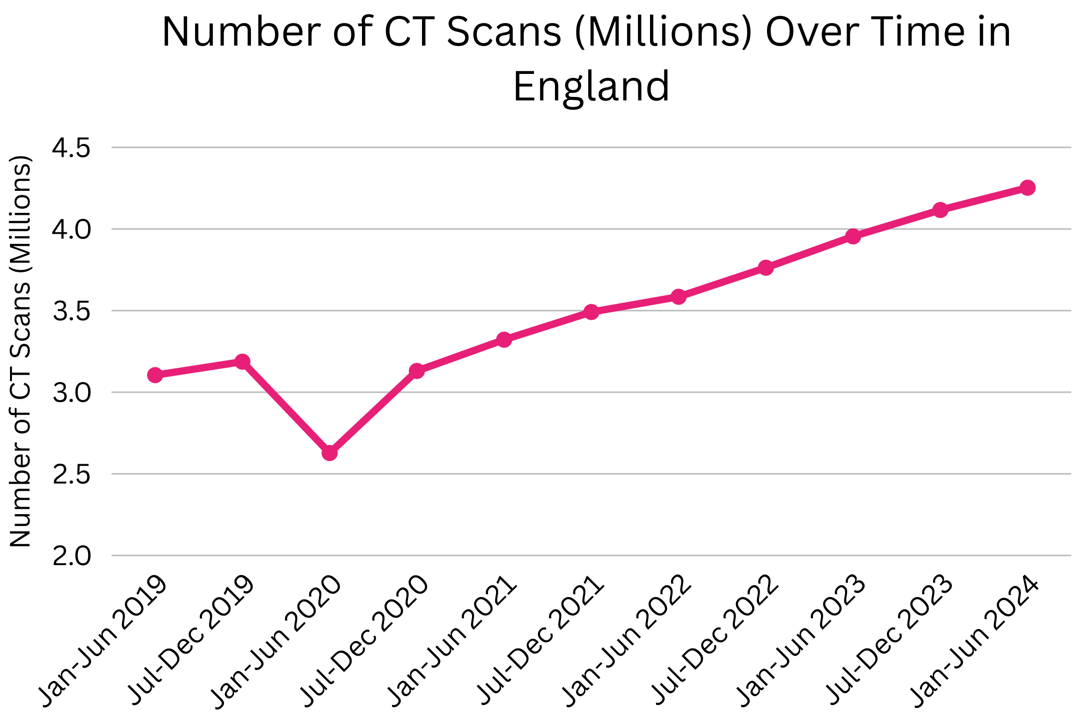


Figure 7: Number of CT scans (millions) per 6-month period in England since 2019.

The number of CT scans performed in England has increased by 25% in the last 3 years, from 3.41 million in the first half of 2021 to 4.25 million in the first half of 2024. This may be related to increased pressures on emergency departments, and expansion of screening programmes[8].

More scans will reflect higher workloads for DR & RP staff, as this increased demand has led to calls for increasing the number of scanners. The current government has pledged to double the number of CT and MRI scanners in the NHS[9]. Clinical Scientists in DR & RP will be required to work with these additional scanners. They contribute to procurement, commissioning, dose audit, optimisation, advice on staff safety etc. Any local or national pledges regarding expansion of complex medical imaging equipment must also account for the staff that work with them. This will ensure services are compliant with legal regulations and protect patient care.

The number of established Clinical Scientist and Technologist posts that we counted has grown over the last three years, from 461.8 to 598.8 WTE. This was required to address the increase in scans. However, **the amount by which the establishment has grown is insufficient to address the increase in activity.** The EU Report 174 recommended staffing level in 2021 was 876.3 WTE. However, in 2024 this has increased to 1042.3 WTE.

Furthermore, DR & RP departments have had significant difficulty in filling these posts, as evidenced by the overall vacancy rate of 15%. Insufficient qualified staff exist to fill these posts, and capacity for training is limited. **Unless this is addressed, demand is likely to continue to increase without the requisite workforce to meet demand.**

Impact of Workforce Shortages

Current workforce shortages in DR & RP have profound impacts on the patient safety, operation of services, and staff retention.

Impact on Patient Safety

Ionising radiation is an invaluable tool in the diagnosis and treatment of disease. However, its use is not without risk. Staff in DR & RP are responsible for supporting employers to have sufficient management and governance processes in place for the safe use of ionising radiation. Inadequate DR & RP staffing introduces risks such as delivering unsafe radiation doses to patients, as well as staff. Inappropriate management of radiation safety can result in higher radiation doses to patients and staff resulting in increased risk of stochastic effects such as cancer. It can also lead to lower exposures than clinically necessary, resulting in poor image quality and reduced diagnostic accuracy of patient imaging.

Inadequate DR & RP staff may negatively impact the quality of medical images produced. Clinical work is reliant on high-quality, accurate imaging: if this is affected, the risk of missing a diagnosis, or delivering an inaccurate diagnosis, greatly increases. This delays and disrupts timely delivery of patient care, which directly impacts health outcomes. More broadly, missed and inaccurate diagnoses erode trust in health services from patients and the public, which introduces further disruptions to patient care.

Impact on Services

The Ionising Radiation (Medical Exposure) Regulations 2017 are a legally binding set of regulations governing the clinical use of ionising radiation. Quality monitoring bodies, such as the CQC in England, ensure compliance with these legal regulations: in some Trusts, they have identified lack of medical physics staffing as an area of concern. This is sometimes identified directly, and sometimes identified as part of deficiencies in service provision. Centres may receive improvement notices, which specify timescales by which the area of concern must be addressed.

Service development, clinical research, and training are likely to be disrupted or prevented by staffing shortages. Routine clinical work often takes priority, but this limits the ability of medical physics services to implement scientific expertise in healthcare. This introduces the risk of worsening the gap between true staffing requirements, and available staffing levels.

Impact on Staff

Current staffing shortfalls exist at a time with an increasing amount and complexity of medical equipment, and increasing numbers of scans being performed. This combination is likely to negatively impact staff morale. Lack of capacity to provide an optimal service to patients is discouraging to staff; work-life balance is also affected by staffing shortfalls. This may lead to burnout and difficulties with staff retention.

Historically, staff retention across all Medical Physics disciplines has been high[10]. However, the DR & RP profession may not be able to take this for granted in the current professional climate. Preliminary evidence taken from IPEM's first State of the Profession survey suggests that substantial numbers within DR & RP – as well as across Medical Physics and Clinical Engineering – have considered leaving their current workplace[11]. This will make it more difficult to attract new staff into a profession that is already experiencing a workforce shortage.

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Appendices

Appendix A - Further Required Resource

Workforce shortages impact a range of critical activities, but the extent of impact varies by activity. Respondents were asked to state the areas in which their centre requires further resource. Results are shown in Figure 8.

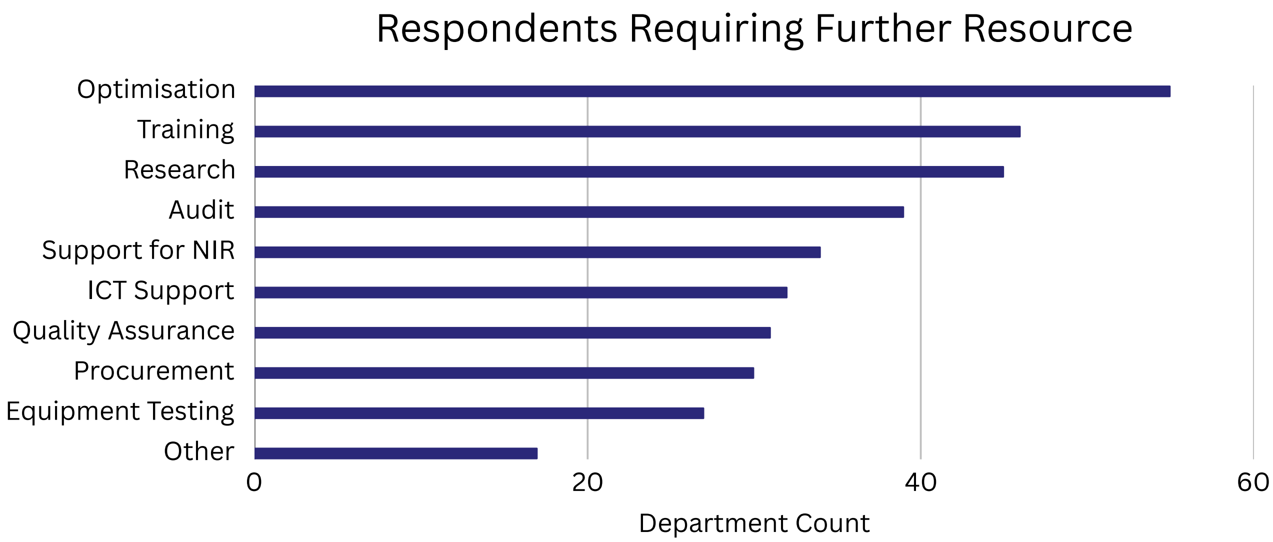


Figure 8: A range of resources, plotted against the number and proportion of responding centres requiring more of them. "Other" includes RPA/RWA provision, especially to radiotherapy; incident investigation; leadership and governance; staffing for introduction of new technologies.

Optimisation, training, and research are the areas in which most centres require further resource.

The aim of optimisation is to achieve the image quality required to answer the clinical question using the lowest radiation dose possible. Optimisation is a key principle of the radiation protection framework within IR(ME)R and the optimisation process is the joint responsibility of the practitioner, operator and MPE requiring close collaboration between medical physics and several other professions. This is a critical, clinical activity undertaken by DR & RP staff that is a legal requirement. Out of 62 respondents, 55 have said that they require more resource in this area. If DR & RP staffing levels are increased, this would result in safer diagnostic imaging practices and reduced risk of harm to patients.

Training is an essential requirement of radiation safety legislation as well as a requirement to development of scientific staff within medical physics services. Training is often de-prioritised when centres are struggling to cope with clinical demands. However, these activities are critical for ensuring staff safety regarding the use of ionising radiation and to ensure the future of the DR & RP workforce.

Research is a fundamental principle of scientific practice, and is part of the program of modernising scientific careers to ensure scientific integration into the health service. Research is another area that medical physics services have had to de-prioritise in order to meet day to day clinical demands.

Centres evidently recognise the importance of training and research in service provision. **This supports the inclusion of training and research requirements in staffing recommendations, at a time when centres struggle to meet clinical demands.**

Appendix B - Establishment by Region

Establishment Levels Per Million Population

Establishment sizes and vacancy rates were assessed relative to geographic region (Scotland, Northern Ireland, Wales, and the seven NHS regions of England). This can be compared with the population of each region, to show how the establishment in each region may compare with local healthcare requirements.

Any regional analysis of the DR & RP workforce will be complicated by the fact that some centres provide services across regional boundaries. However, regional establishment figures can be used alongside data for individual departments to inform regional workforce planning. Information on regional establishment levels and vacancy rates for Clinical Scientists are shown in Figure 9. The same information for Clinical Technologists is shown in Figure 10.

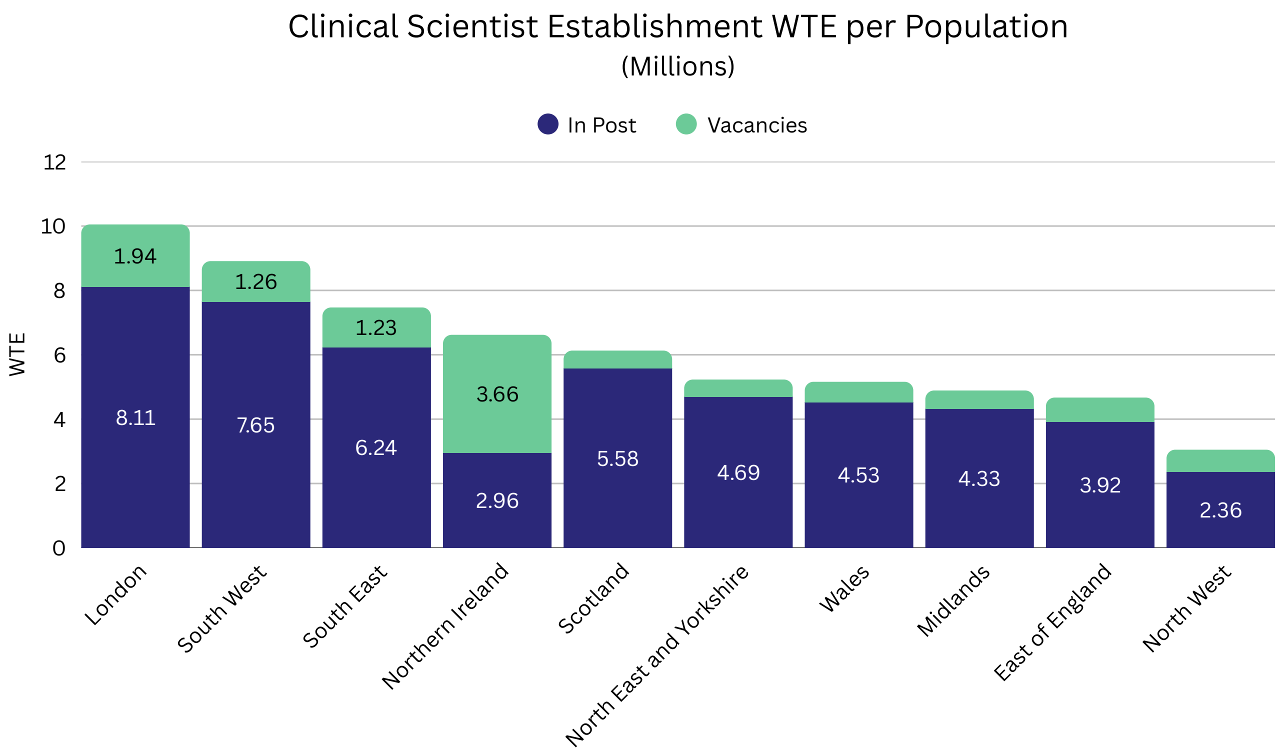


Figure 9: The number of Clinical Scientist posts, in WTE, that are filled and vacant per million population in each region.

The average number of Clinical Scientist posts in WTE per million population across all regions is 6.22. Regional data must be interpreted within the context of differing clinical needs across England. Disease incidence and life expectancy vary geographically[12], as do the number of scans performed per centre, and the length of time to receive diagnosis and treatment[13].

Regional inequalities are evident in the DR & RP establishment figures. The difference between the largest and smallest regional Clinical Scientist establishment per population is approximately 7 WTE Clinical Scientists. Furthermore, the three regions with the greatest number of Clinical Scientist posts per million population are all located in the south of England.

Northern Ireland has substantially more Clinical Scientist vacancies per million population than any other region. This is reflected in its regional Clinical Scientist vacancy rate of 55%. In comparison with the other regions and devolved nations, Northern Ireland has a small Clinical Scientist establishment that serves a wide geographic area. The effect of a small number of vacancies will therefore be pronounced in this area.

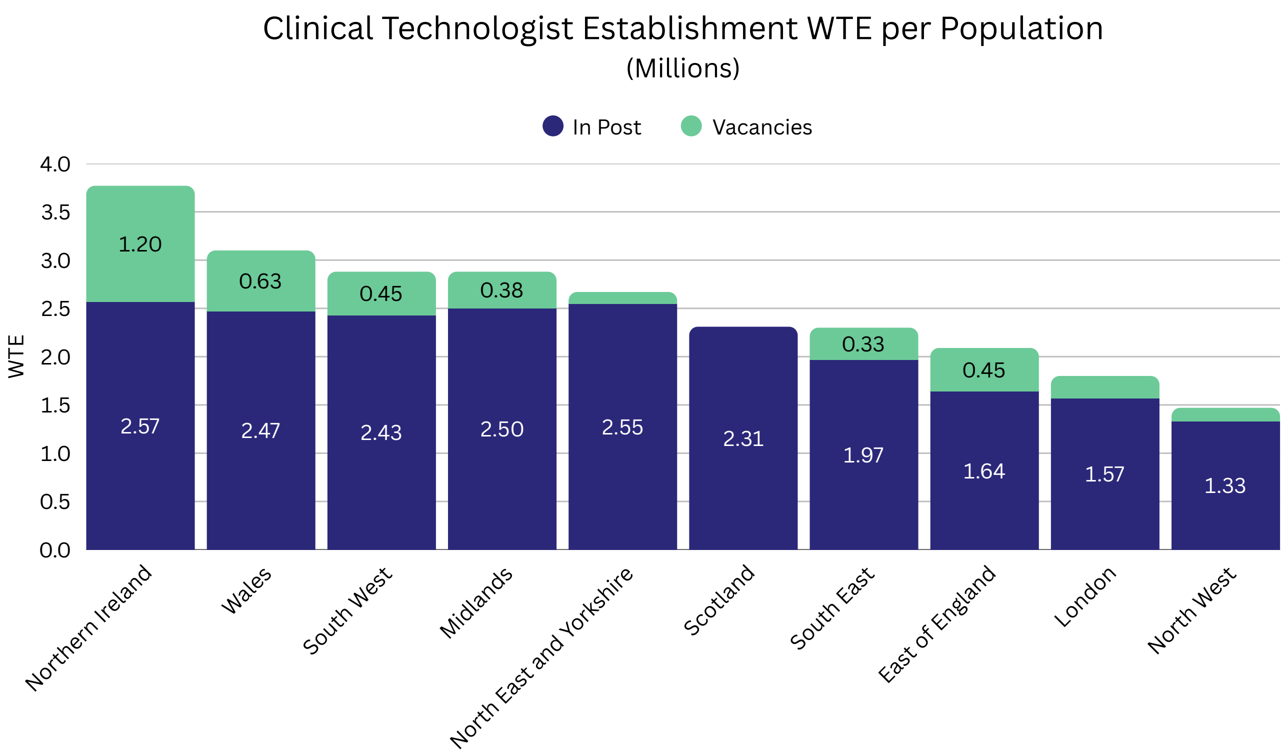


Figure 10: The number of Clinical Technologist posts, in WTE, that are filled and vacant per million population in each region.

The average number of Clinical Technologist posts in WTE per million population across all regions is 2.53.

Regional inequalities in the Clinical Technologist establishment are not as pronounced as those of the Clinical Scientist establishment. This may be due in part to the fact that the Clinical Technologist establishment is smaller. Additionally, the proportion of Clinical Technologist vacancies is smaller than those of Clinical Scientists.

Northern Ireland shows the highest proportion of Clinical Technologist vacancies per million population, similar to the Clinical Scientist figures. However, Northern Ireland also has the most Clinical Technologist posts per million population in the UK. This may be to account for the relative paucity of Clinical Scientists, and may enable an effective skill mix in the workforce.

Appendix C - Banding Profile

Respondent comments indicated particular difficulty in filling posts for qualified staff. Further analysis was undertaken to determine the levels at which most vacancies lie. This was done by stratifying the numbers of filled and vacant posts into NHS Agenda for Change (AfC) bands. This is unlikely to completely reflect true skill mix and workforce needs, as establishment sizes will depend on available resource within individual Trusts.

Figures 11, 12, and 13 show the banding profile for Clinical Scientists, Clinical Technologists, and other clinical staff respectively. Some Independent respondents are unable to map their workforce to the NHS AfC banding scheme. These respondents accounted for a total establishment size of 11.6 WTE Clinical Scientists. 3.0 WTE vacancies were counted, all at the mid-career level.

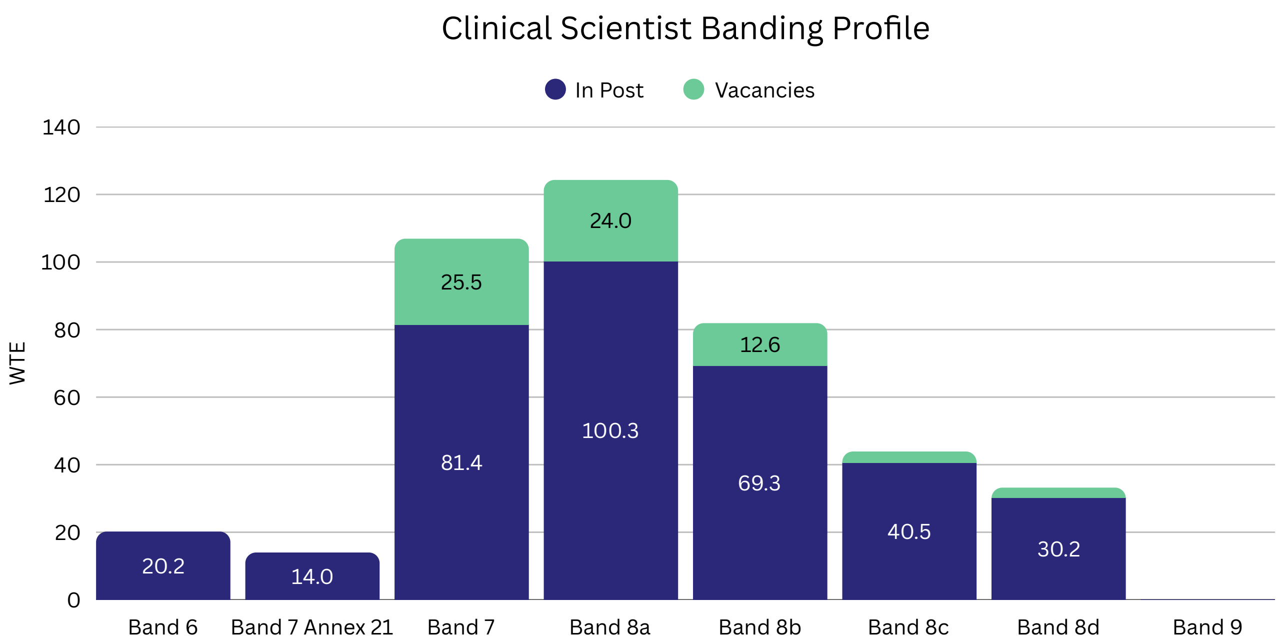


Figure 11: The Clinical Scientist workforce in-post and vacant, shown in WTE and split by AfC banding.

The majority of Clinical Scientist vacancies exist at bands 7 and 8a. Band 7 is representative of newly qualified Clinical Scientists. Those at band 8a, meanwhile, are likely to be moving towards the mid-career stage, and will have gained an expert physics qualification (RPA, RWA, MPE, LPA) or be close to certification.

Some of the current vacancies have been advertised several times without resulting in successful recruitment. In total, the current Band 7 vacancies have been unsuccessfully advertised 30 times. The current Band 8a vacancies have been unsuccessfully advertised 34 times.

The immediate need for qualified Clinical Scientists, and the difficulties in recruiting them, are clearly demonstrated. Trainee intake must increase in order to address the lack of suitable candidates for these roles. However, vacancy rates at all levels are indicative of reduced training capacity.

It is important to remember that, although there are fewer vacancies at higher bands, this does not indicate a lesser need for staff at these levels. Suitable candidates become sparser as seniority, or NHS banding, becomes higher.

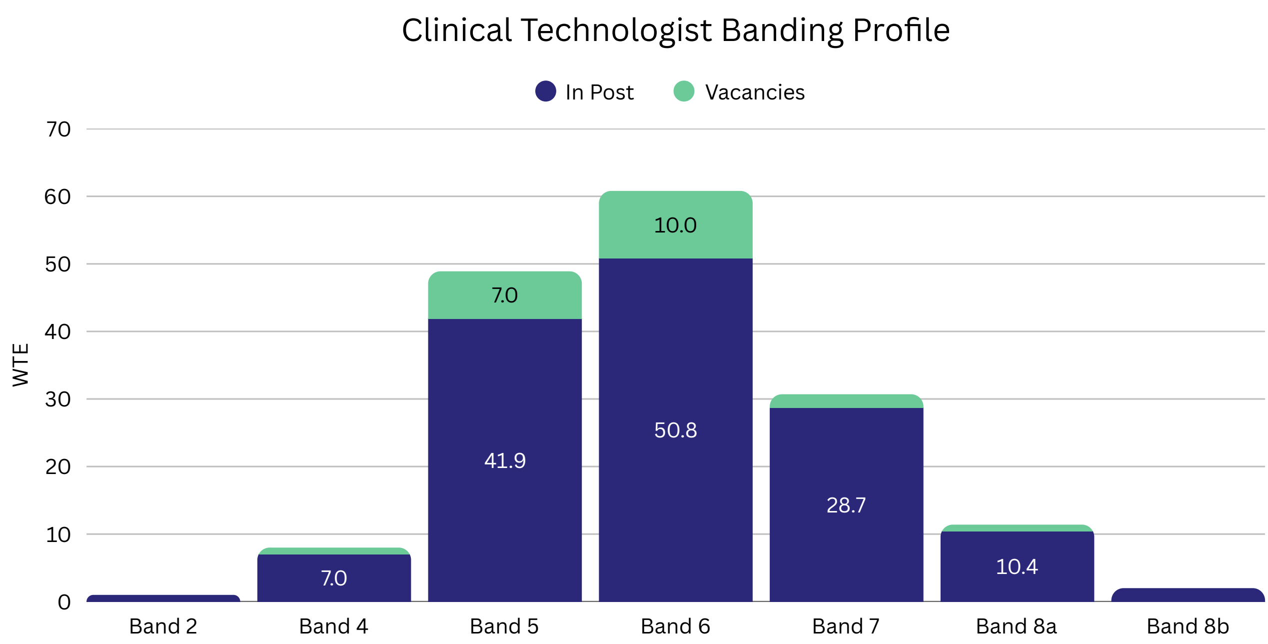


Figure 12: The Clinical Technologist workforce in-post and vacant, shown in WTE and split by AfC banding.

Most Clinical Technologist vacancies are at bands 5 and 6. Typically, Clinical Technologist trainees are represented by bands 5 and under, although some Clinical Technologists at band 5 may be considered qualified. Those at band 6 are no longer in training, and may be eligible for registration on the Register of Clinical Technologists.

Clinical Technologist vacancies are less numerous than those for Clinical Scientists. However, **the requirement for Clinical Technologists that have completed training is apparent.**

The shortage in the Clinical Technologist establishment, and vacancies, above band 6 may be reflective of career progression concerns for this group. It was outlined in a previous section that some Clinical Technologists feel that the only way to progress is by becoming Clinical Scientists.

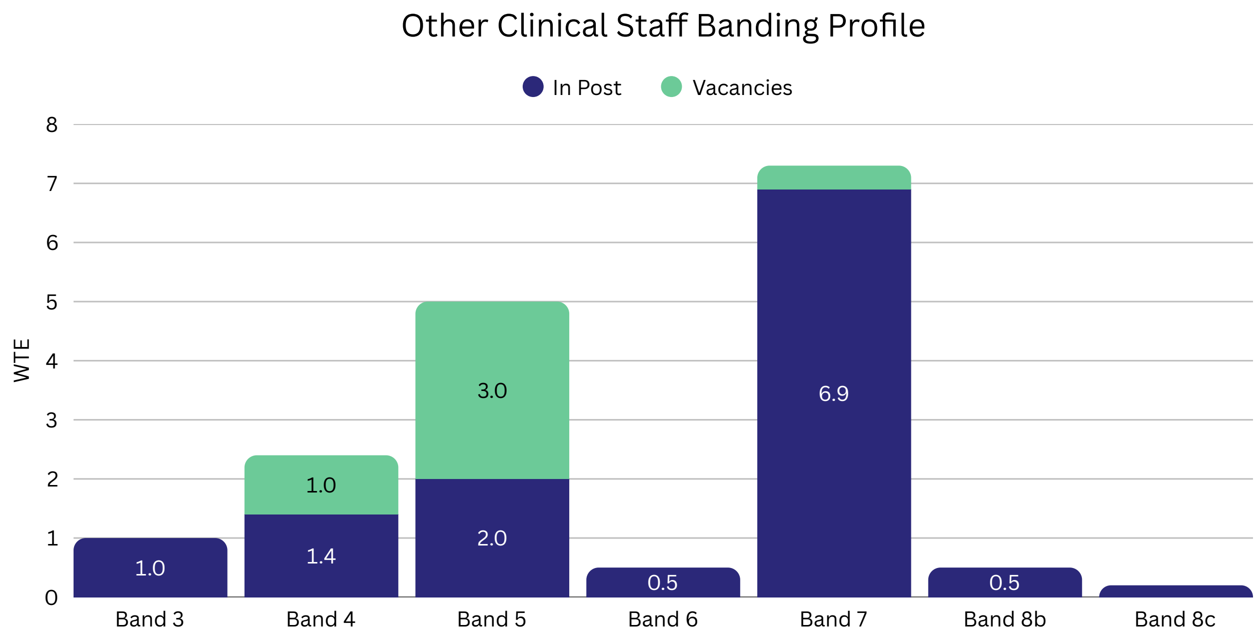


Figure 13: The clinical workforce of neither Clinical Scientists nor Technologists, in-post and vacant, shown in WTE and split by AfC banding.

Staff in this category represent roles that are neither Clinical Scientists nor Clinical Technologists, but are strategic solutions to managing clinical workload. The establishment in this category, and by extension the vacancies, are few in number.

Most WTE vacancies among Other Clinical Staff are at bands 4 and 5. These represent pre-registration clinical staff (i.e., Assistant/Associate-level roles). **These staff may contribute very effectively to the skill mix of the workforce.** They may, for example, have programming skills that can be used in task automation. Other suggested responsibilities could include administrative support for meetings (including minute taking), contract management, or managing staff dosimetry. Centres that experience recruitment difficulties may explore similar solutions to improving efficiency.

Appendix D - Training Output

Training new staff is essential to addressing workforce shortages. Figure 14 shows current and predicted training output for Clinical Scientists in DR & RP.

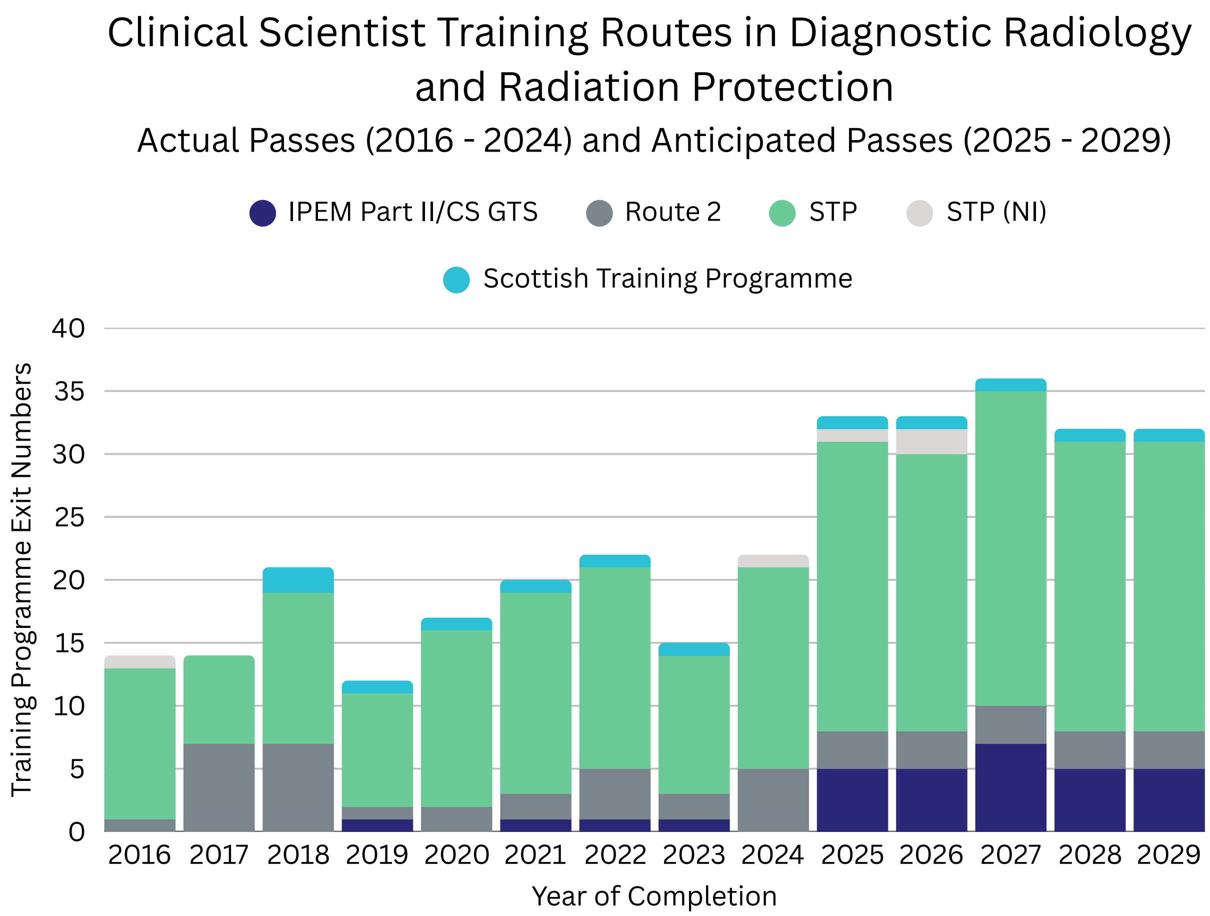


Figure 14: The number of newly qualified Clinical Scientists joining the DR & RP workforce each year from 2016, for each established training route. Predicted figures are shown for the years 2025 through 2029.

It is estimated that 59 Clinical Scientists joined the workforce through UK training routes between 2022 and 2024, since the previous survey was undertaken. Between 2025 and 2027 – an equivalent time period – it is estimated that 102 new UK-trained Clinical Scientists will enter the DR & RP workforce. This shows an increase in Clinical Scientist intake with time, reflecting increased training efforts across the UK.

Our previous DR & RP workforce report, in 2021, indicated that an annual injection of 114 Clinical Scientists would be required to meet workforce recommendations in 5 years. The 59 entrants over 3 years has clearly not kept pace with this. In predicting future workforce needs, plans for service expansion can be examined.

Service expansion may be predicted on the basis of planned additional medical equipment. At the time of writing this report, the current Government has pledged to double the number of CT and MRI scanners in NHS hospitals[9]. EU Report 174[4] provides recommendations on the number of staff required per CT scanner as well as other x-ray imaging modalities. **If the number of CT scanners only were to double, an increase in the total DR & RP establishment of between 93 and 187 staff WTE would be required.** This is in addition to the current staffing recommendations.

We might assume a timescale of 5 years for the pledge of doubling the number of scanners. To fill vacancies, meet staffing recommendations, and keep pace with planned expansion, **an annual injection of between 75 and 87 Clinical Scientists into the DR & RP workforce would be required over the next 5 years**. It is clear that the predicted yearly increase of 33 Clinical Scientists falls short of this.

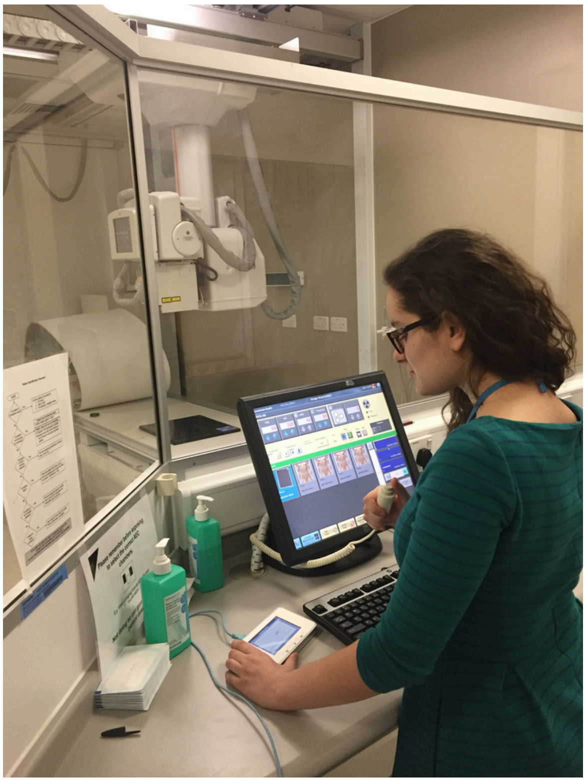
Making similar estimates for Clinical Technologists is difficult. The lack of statutory registration of Clinical Technologists means that it is not possible to define and monitor all training routes, unlike with Clinical Scientists. However, the calculated additional staff requirement for doubling the number of scanners included Clinical Technologists. We may assume that Clinical Technologists would account for 25 to 50 staff WTE out of the required 93 to 187 additional staff over the estimated 5 years.

Workforce attrition is not accounted for by these predictions. Some attrition may be accounted for by retirement; some may be explained by staff seeking alternative career paths, among other reasons. Preliminary evidence from IPEM's first State of the Profession survey suggests that increasing numbers of DR & RP staff may be considering leaving their workplace[11]. Therefore, the true trainee requirement is likely to be higher.

Information on the training schemes currently supported by DR & RP centres is helpful in the planning of training solutions. Figures 15 and 16 show the number and proportion of centres that support each training route for Clinical Scientists and Clinical Technologists respectively.

Fifty seven out of 62 respondents indicated supporting some form of Clinical Scientist training. Of the five that did not, two were independent services. The most commonly supported training schemes are the Scientist Training Programme (STP), and the Association of Clinical Scientists' Route 2. Most Scottish respondents also support the Scottish Training Scheme.

Meanwhile, 34 out of 62 respondents – approximately 55% – indicated supporting Clinical Technologist training. No independent services currently support Clinical Technologist training. This may be due to their service models not requiring them.



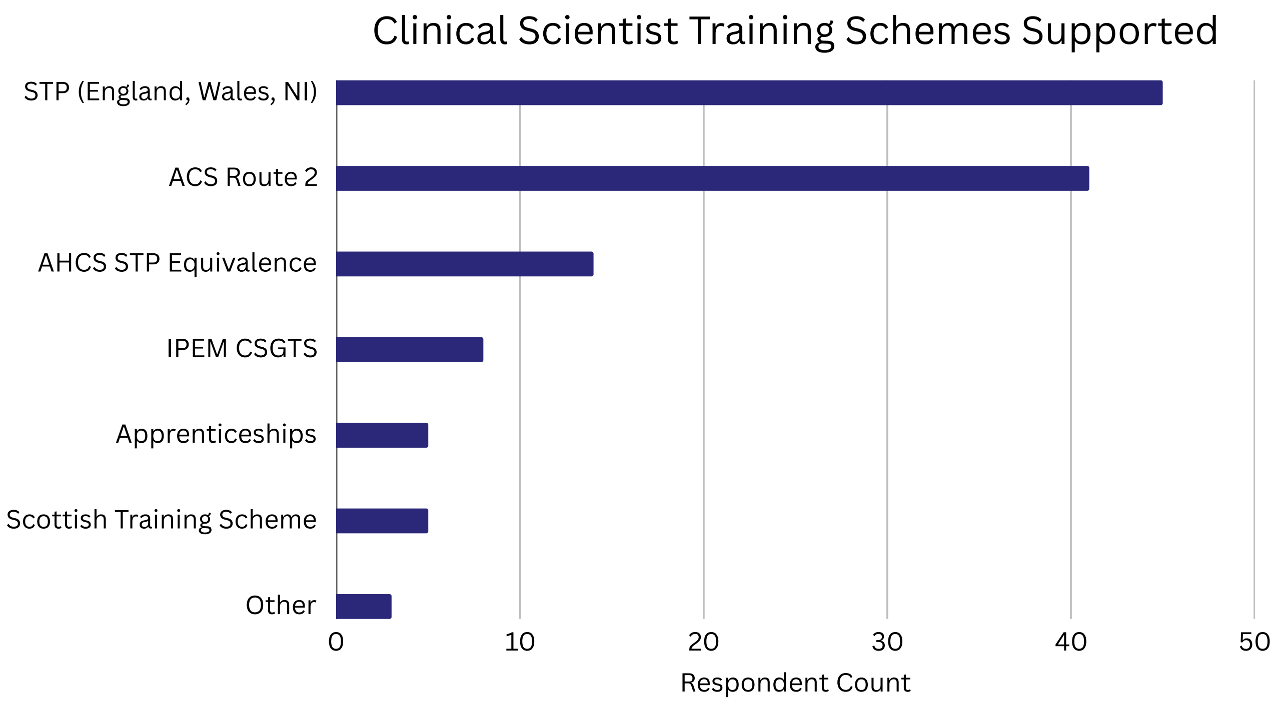


Figure 15: Different Clinical Scientist training schemes, plotted against the proportion of responding centres that support each training scheme. The number of responding centres supporting each training scheme is also indicated. “Other” supported training schemes include the requirement of non-Clinical Scientist certifications (e.g., CRadP, RPC).

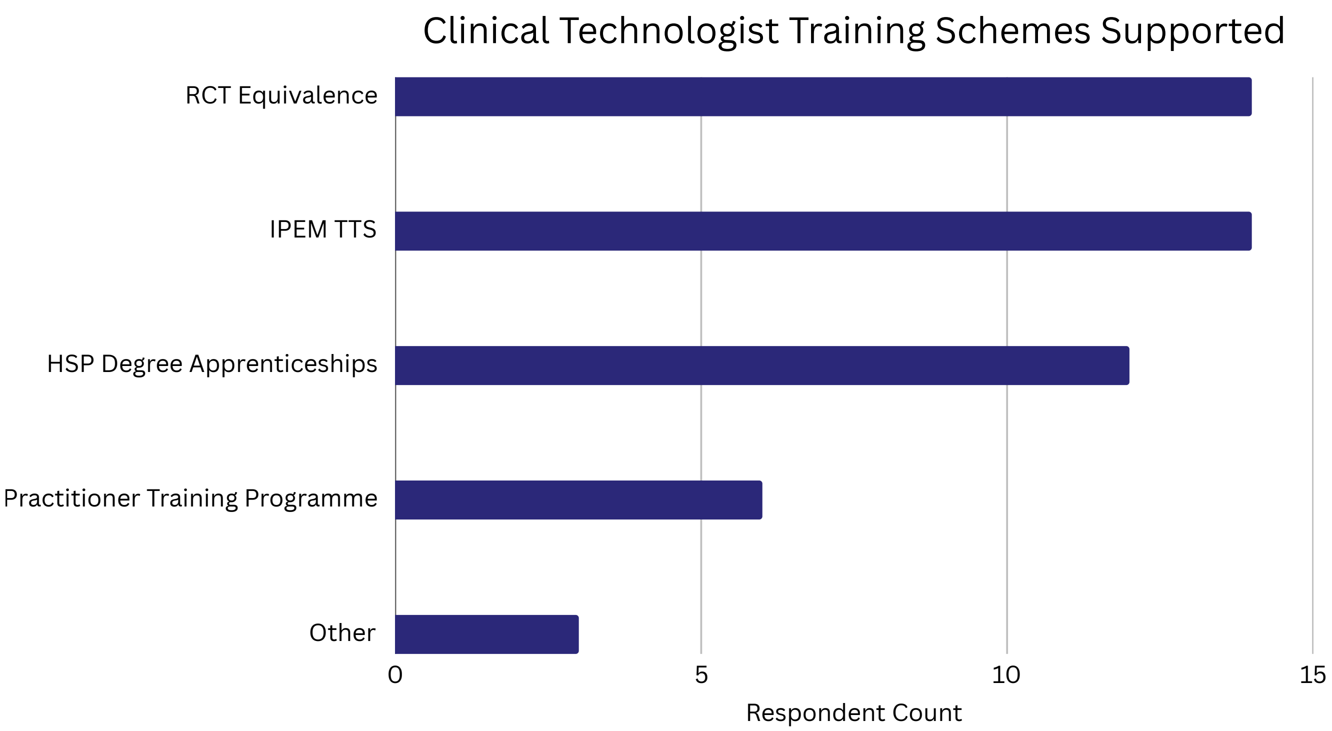


Figure 16: Different Clinical Technologist training schemes, plotted against the proportion of responding centres that support each training scheme. The number of responding centres supporting each training scheme is also indicated. “Other” supported training schemes include “in-house” training.

Further comments on training provision could be broken down into the following themes: availability of funding, staff capacity for training, regional solutions to address training concerns, and resources for supporting continuing professional development (CPD).

Availability of Funding

Comments on the lack of funding to support training were frequent. Limited availability of funding impacts multiple areas, including full-time trainee posts, qualified posts for when staff complete training, and expert qualifications (e.g., MPE, RPA).

Trusts are in dire need of increased funds to support and grow their DR & RP workforce. This funding should be used strategically: it should be allocated to a range of training programmes to enable diversification of the workforce, and individual Trusts should be supported to create posts for trainees as well as recently qualified staff.

Staff Capacity for Training

Training new staff places a heavy burden on experienced staff. All training involves an in-service component, where trainees gain experience within the workplace. This requires experienced staff to supervise and check the work of trainees. However, as clinical demands must take priority, training duties are at risk of being overridden. As previously detailed, current DR & RP staff have little capacity to support the required training. This is especially challenging in the case of Clinical Technologists, as many end up pursuing Clinical Scientist training.

IPEM's Clinical Technologist Training Scheme has recently undergone development to better support trainees and trainers[14]. In the short term, implementing these developments has been challenging due to heavy workloads and training burden on staff. However, this will hopefully support the workforce in the future by improving the efficiency of Clinical Technologist training. More broadly, training solutions on the regional level could be considered.

Regional Training Solutions

Some respondents suggested regional provision of training as a means of improving training efficacy and improving training capacity issues. Regional practice educators in England, or local training lead scientists in the devolved nations, may take advantage of economies of scale to train a larger number of individuals with reduced staff time commitment per trainee. Comments came from respondents who had used these trainer posts to good effect, as well as those who would like to have access to these resources.

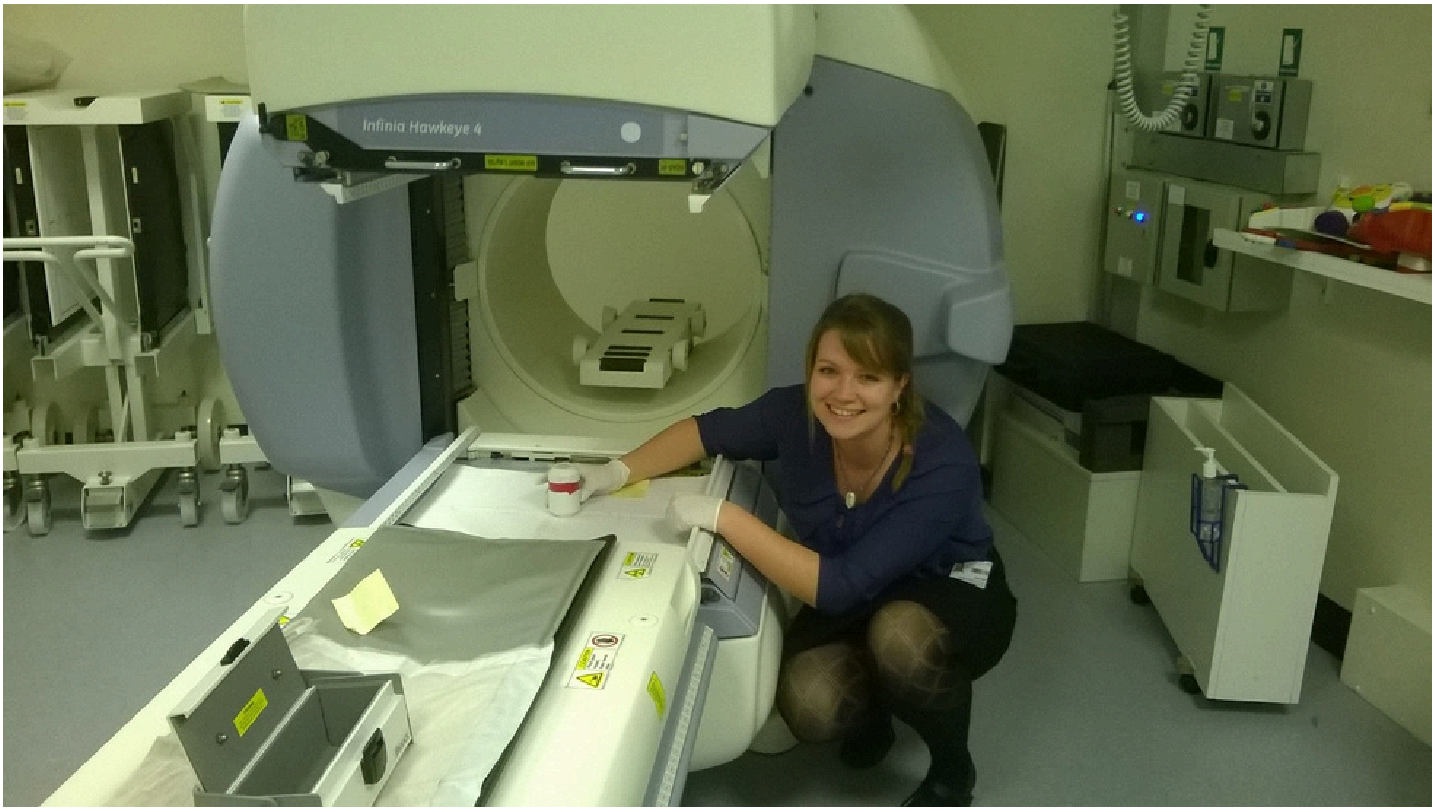
Although regional practice educators and local training leads have been used to good effect, some respondents have also commented on difficulties associated with these posts. There is a lack of suitable, experienced staff to fill these roles. In addition, these roles may be offered on the basis of a short-term, fixed contract, which increases the difficulty in recruiting to them. A proposed alternative in the provision of regional training is the sharing of training responsibilities across multiple individuals. This may involve creating job roles with protected time for non-clinical activity: some of this time may be dedicated to training provision. It is in the interest of the DR & RP profession for all staff to have some investment in training.

"We would like to train more people as the profession needs it, but there are not enough of us to train them. It is a cyclical problem!"

Resources for Continuing Professional Development (CPD)

Continuous training for qualified professionals is essential to ensure an adequate number of staff qualified for senior roles. It also ensures that professional expertise keeps pace with advancements in a complex, rapidly developing field. However, participants commented on a lack of funding specifically for these activities. They can additionally be very time consuming, which is difficult to support in a stretched workforce.

Efforts should be made specifically to support CPD, in addition to pre-registration training posts. This may be done by streamlining accreditation and reaccreditation for expert certifications, for the benefit of suitably experienced staff. This would be particularly valuable for the DR & RP profession, where experienced staff are likely to hold multiple expert certifications. In addition, job roles should allow for protected time to engage in non-clinical activity. This would enable staff to engage with CPD, in addition to other training-related responsibilities. Finally, protected CPD funding for DR & RP professionals should be available to Trusts.



Appendix E – Consultant Clinical Scientists and the Higher Specialist Scientist Register

Consultant Clinical Scientists (CCS) represent a well-established role within Medical Physics. The role describes Clinical Scientists acting with the same level of professional competency as medical consultants. They are responsible for strategic leadership, quality improvement, innovation, and research to modernise and improve care.

The Higher Specialist Scientist Register (HSSR) provides professional recognition for Clinical Scientists working at consultant level. It provides a standard framework for CCS roles, including job description and pay banding. HSSR registration reflects a high standard of clinical and scientific leadership, knowledge to support consultant-level clinical advice, and strategic direction and innovation supporting service development.

There are two available routes to HSSR registration. One is a formal training route called Higher Specialist Scientist Training (HSST). The other is an equivalence route called Higher Specialist Scientist Equivalence (HSSE), in which requisite competencies are demonstrated through practical work and research experience.

Respondents were asked to state the number of staff at their centre who are registered on the HSSR, or working towards registration. Routes to registration were also queried. Results are shown in Figure 17.

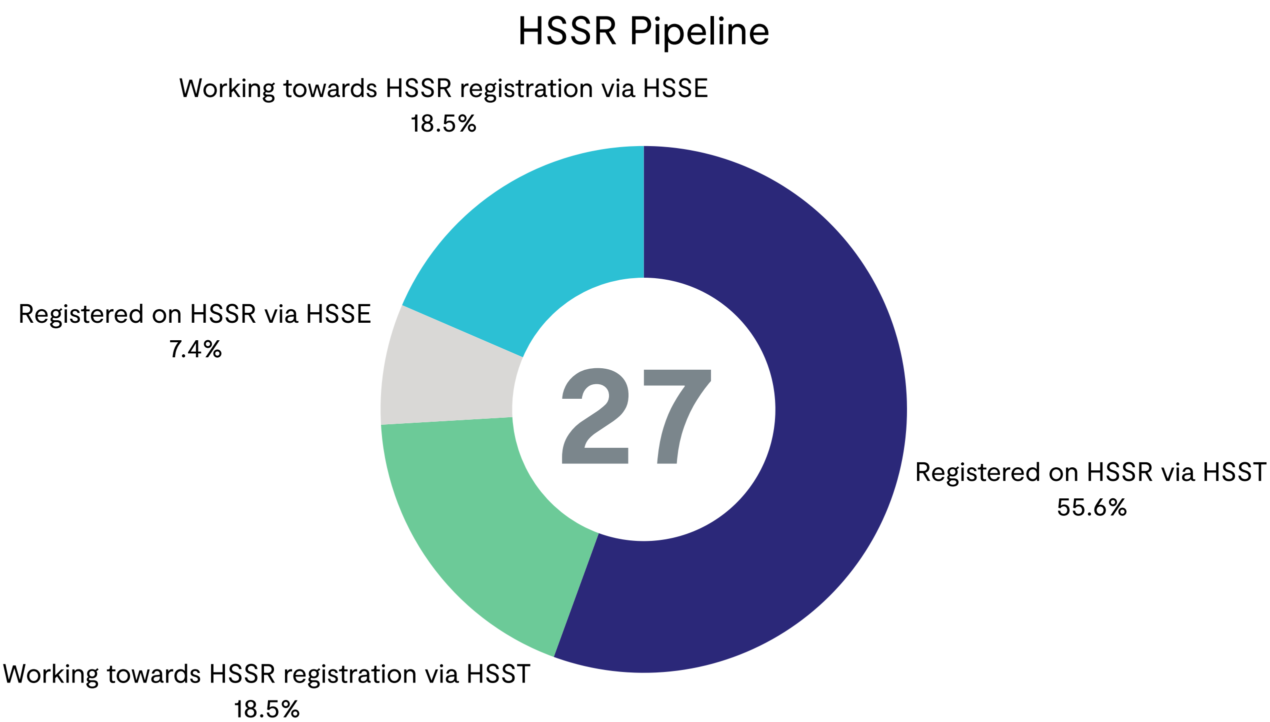


Figure 17: A pie chart showing the number of staff that are either on or working towards HSSR registration. Proportions of staff achieving registration through each available pathway are shown.

Seven staff are reported to hold HSSR registration, and a further 20 are reportedly working towards it. Altogether, this accounts for approximately 7% of the total Clinical Scientist headcount. Approximately three quarters of these staff follow the HSST route.

This indicates a lower uptake of HSSR registration in DR & RP than in other disciplines, such as Radiotherapy[7]. This may be because experienced Clinical Scientists in DR & RP are often required to hold multiple expert registrations. These may take precedence over HSSR registration. Secondly, comments on HSSR indicate that in a workforce already under pressure, the benefits of HSSR registration are seen by some as smaller than the time and financial costs of achieving it.

Appendix F – Age Profile

The age profile of professional groups can provide an indication of upcoming retirements. This can work to inform future workforce planning. Figure 18 shows the age profiles of all professional groups in DR & RP. The age profiles of Clinical Scientists and Clinical Technologists broadly mirror the most recently published data on the age profile of NHS staff in England[15].

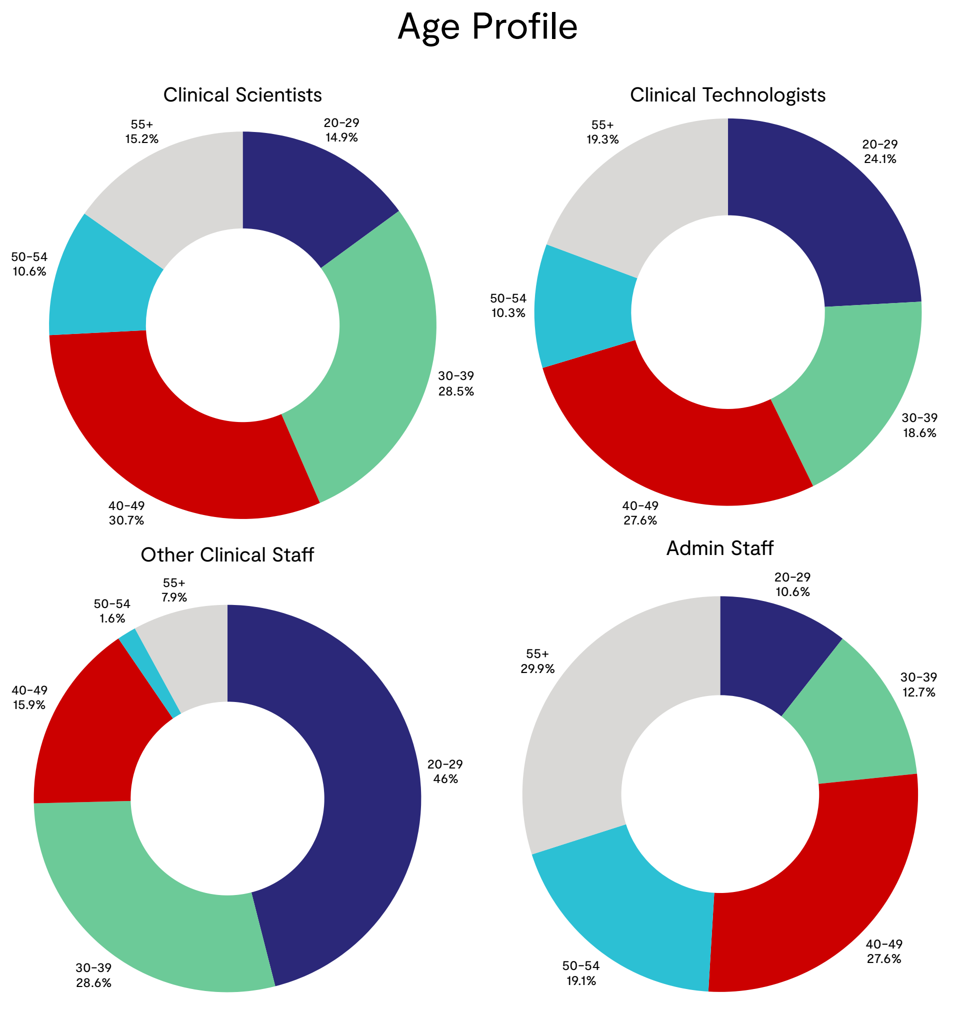
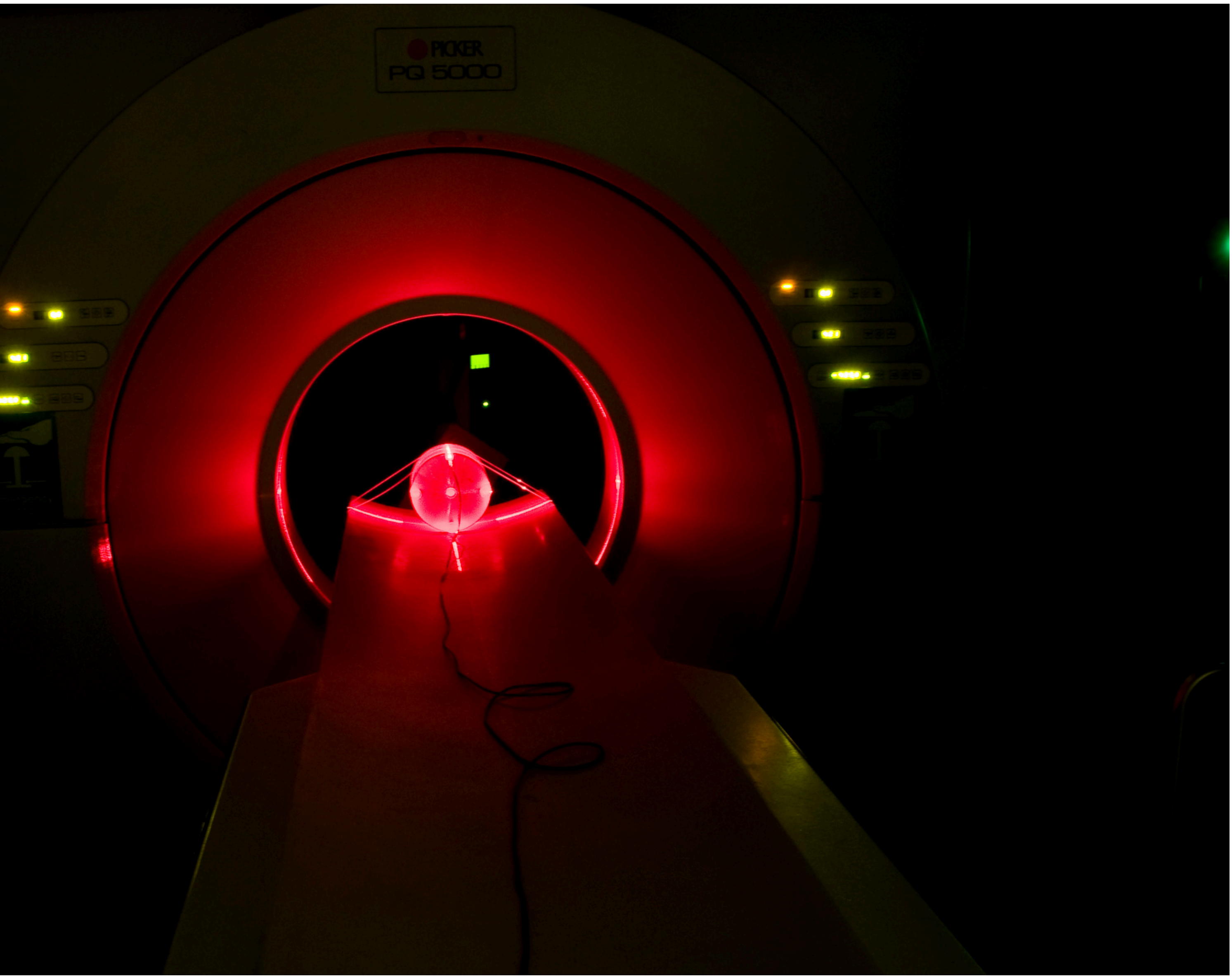


Figure 18: A series of donut charts showing the age profile of all professional groups.

Nearly 50% of “Other” staff are below the age of 30. A large proportion of these staff represent trainee or apprentice roles. Thus, the true proportion of Clinical Scientists and Technologists over the age of 50 may be lower than the present findings suggest.

Age profiles within DR & RP do not indicate an immediate cause for concern over impending retirements. However, this should be monitored over time and may be used to inform workforce planning. Current low training levels may lead to an ageing workforce over time. This, in future, might imply even fewer experienced staff available to provide training, which would become harder to address over time without decisive action.

Efforts to support staff retention now will have implications for supporting the workforce of the future. One suggested strategy is to promote and support flexible working. The RCR’s 2023 workforce survey found that staff who were able to work part-time retired later than those who did not[8]. This can work to retain valuable knowledge and experience, and may support vital non-clinical activity within centres, in the long term.



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