

# Clinical radiology UK workforce census 2019 report





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**We have a fragile workforce under relentless pressure. My main concern is unsafe patient care.**

## Foreword

Imaging has a massive impact across the healthcare sector. Radiology forms a central part of the experience and treatment of vast numbers of patients, with over 100,000 imaging examinations carried out across the UK every day.<sup>1</sup> Imaging is fundamental to cancer diagnosis and treatment, major trauma services, the assessment and treatment of stroke and a wide range of other life-changing diagnoses and vital services.

The 2019 clinical radiology workforce census findings are grave. Once again, they highlight the continued growth in demand for diagnostic imaging and interventional radiology services, alongside further increases in workforce shortages. These are issues we have raised for many years and, worryingly, the continuing workforce shortages are impacting the cost and quality of patient care. Seven out of ten clinical directors of UK radiology departments feel there are insufficient clinical radiologists to deliver a safe and effective level of patient care, while outsourcing costs in the UK have increased by 32% over the past year alone to £108 million in 2019. Workforce shortages are negatively impacting waiting times, report turnaround times and overall system performance. Workforce shortages have been compounded by the consequences of national policy, particularly in respect of pension-indexed taxation which has forced doctors to reduce their working hours to avoid punitive tax bills.

The 2019 census report demonstrates unequivocally that our current imaging and interventional radiology services are unsustainable; governments and policy makers from across the sector and from all four nations must take action. Otherwise, patients are at risk. To achieve ambitions for early diagnosis and high-quality patient care, including those set out in the NHS *Long Term Plan*, an increase in the imaging workforce is essential and overdue.<sup>2</sup> This can and should be achieved through a combination of increased training places, international recruitment and improved workforce retention. Service development is also necessary, including radiology networks which, if effectively implemented, have the potential to increase access to specialist expertise.<sup>3</sup>

For the first time, this year we have included questions about the provision of interventional radiology services across the UK. Minimally invasive therapy is vital for the delivery of safe patient care and avoiding unnecessary surgery. The results make disappointing reading from a patient's perspective; only half of trusts and health boards can provide a comprehensive 24-hour service, and there is a severe shortage of experts to provide both vascular and non-vascular interventional radiology procedures.

Ultimately, improvements in workforce planning and increased funding are needed to meet growing demand, ensure a sustainable radiology workforce and deliver the high-quality radiology services that patients need and deserve. This report seeks to inform such workforce planning.

We want to thank all imaging departments for completing the census, and clinical directors and workforce leads for their support and engagement. We are delighted that, for the twelfth year running, we have a 100% completion rate. Our RCR Regional Chairs have been vital in supporting and encouraging departments to complete the task and we could not have done it without them.

Professor Mark Callaway

**Medical Director, Professional Practice, Faculty of Clinical Radiology**

## 1. Executive summary

### 1.1 Objectives

The objectives of The Royal College of Radiologists' (RCR) 2019 clinical radiology workforce census are to:

1. Provide comprehensive, accurate and timely information on the numbers, distribution and working patterns of UK consultant and specialty and associate specialist (SAS) grade clinical radiologists in NHS radiology departments
2. Forecast future workforce numbers and working patterns by analysing census data and trends together with RCR specialty training data
3. Estimate the extent to which the workforce supply and demand for diagnostic and interventional radiology across the UK are aligned
4. Gain insight into the methods used to manage the shortfall in the radiology workforce and the associated costs.

The data and trends identified in this report should inform local and national radiology workforce training, planning and policy.

### 1.2 Key findings

Workforce shortages in clinical radiology are negatively impacting patient care by delaying diagnosis, restricting the availability of interventional radiology procedures and increasing waiting times.<sup>3</sup> Furthermore, workforce shortages are pushing up NHS outsourcing and locum costs and are putting the radiology workforce under immense pressure.

#### Workforce shortages in clinical radiology are increasing year on year, resulting in delayed diagnoses for patients

- The current shortfall of 1,876 radiologists (33%) is forecast to rise to 3,331 (43%) by 2024. Over the past year alone, volumes of computed tomography (CT) imaging examinations in England have increased by 10% and MRIs by 8%.<sup>1</sup> This compares with 3% growth in the clinical radiology workforce. The increasing gap between workforce supply and demand is unsustainable.
- Seven in ten clinical directors of UK radiology departments (71%) feel there are insufficient clinical radiologists to deliver a safe and effective level of patient care.

#### Interventional radiology (IR) provision is patchy and puts patients at unacceptable risk

Trusts/health boards need a minimum of six whole-time equivalent (WTE) interventional radiologists to provide an effective and sustainable 24-hour IR service.<sup>4</sup> Alternatively, formal transfer arrangements need to be in place (24/7), to transfer patients to other trusts/health boards for IR procedures.

- In 2019, almost half of trusts/health boards (46%, n=79) did not provide adequate IR services, with insufficient radiologists on their rotas or no rota at all and no formal transfer arrangements for patients needing IR procedures. This puts patients at unacceptable risk.
- Census data indicate that 386 additional interventional radiologists are currently needed in the UK to meet IR guidelines;<sup>4</sup> this equates to an IR workforce shortfall of 37%.

### Costs have escalated, as radiology departments struggle to meet the fast-growing demand for complex imaging

- Only 1% of UK trusts/health boards (n=2) were able to meet their reporting requirements within consultant clinical radiologists' contracted hours in 2019.
- Radiology departments spent an estimated £193 million on outsourcing to teleradiology companies, insourcing<sup>a</sup> and the employment of ad hoc locums in 2019. This expenditure has more than trebled over the past five years. For context, £193 million is equivalent to the combined salaries of more than half the existing consultant clinical radiologist workforce.
- Outsourcing costs are rising particularly steeply. In 2019, £108 million was spent on outsourcing, a stark 32% increase over the past year.

### Consultant radiologists are feeling overworked and undervalued, with early retirement resulting in the loss of valuable expertise across the UK

- The general trend over the past five years has been one of increased numbers of consultant clinical radiologists leaving each year. At a national level, strategies for improving staff retention are not yet having any noticeable impact.
- Half of the clinical radiologists who retired in 2019 were aged below 60. However, census data show that full-time clinical radiologists tend to retire two to three years earlier than their less-than-full-time counterparts, indicating that flexible roles may improve staff retention for consultants approaching retirement age.
- More than one in ten consultant clinical radiologist posts are now vacant. The number of vacancies has risen sharply over the past three years from 303 in 2016 to 466 in 2019. The majority of the 2019 vacancies (six in ten) are long-term posts that have been unfilled for a year or more. Covering workforce gaps can put considerable strain on the existing workforce.

### Specialist breast and chest/lung radiologists' roles appear to be particularly vulnerable to workforce shortages

- **Breast specialists:** One in four trusts/health boards across the UK have at least one vacant consultant breast radiologist post. This is set to increase as a quarter of consultant breast radiologists (26%, n=134) are forecast to retire over the next five years. There appears to be a shortage of younger consultant breast radiologists to meet the forecast shortfall, with four breast radiologists expected to leave the workforce over the next five years for every three that join (see Section 4.6).
- **Chest/lung specialists:** Approximately one in five trusts/health boards across the UK have at least one vacant consultant chest/lung radiologist post. This is set to increase as almost one-third of consultant chest/lung radiologists (31%, n=86) are forecast to retire over the next five years. There appears to be a shortage of younger consultant chest/lung radiologists to meet the forecast shortfall, with three chest/lung radiologists expected to leave the workforce over the next five years for every two that join (see Section 4.6).

<sup>a</sup> Paid reporting by departments' radiologists, additional to core contracted hours.

## Closing the gap

The radiology workforce is currently understaffed by 1,876 radiologists. This means that we only have two thirds of the workforce that we need. To meet current demand we need 5,608 WTE radiologists. Furthermore, the understaffing is forecast to rise to 3,331 (43%) by 2024, with the widening gap driven by increased demand for diagnostic imaging and interventional procedures. There is no simple solution to this workforce crisis, but certain measures may go some way to improving the situation. In basic terms, we need:

- An increase in specialist training numbers and trainers with the capacity and skill to teach them
- More robust measures to improve staff retention, including better working conditions and smarter job planning
- Simplified pathways for recruiting skilled doctors from overseas
- A culture of collaboration that embraces new models for imaging networks and multidisciplinary working
- An educational landscape that is fit for purpose.

The RCR continues to be heavily involved in helping to implement such measures. Indeed, over the past year alone, we have:

- Launched our **Credential in breast disease management**<sup>5</sup>
- Submitted our **Interventional neuroradiology (INR) (Acute Stroke) credential for clinicians from non-IR and non-IR backgrounds** to the General Medical Council (GMC) for review
- Published our **report on the vital role of SAS doctors: Harnessing the experience and clinical expertise of staff and associate specialist (SAS) doctors**<sup>6</sup>
- Advocated for a solution to the issue of **tax charges on NHS pension schemes**
- Worked to support our Fellows and members in the effective roll-out of **imaging networks**
- Co-chaired the diagnosis workstream of the **Taskforce for Lung Health**
- Written a paper, jointly with the British Society of Thoracic Imaging (BSTI), on how radiology is key for effective implementation of **targeted lung health checks**
- Submitted extensive evidence on workforce shortages via our **consultation responses** to health leaders.

Further details on RCR recommendations and actions can be found in Sections 6.1 and 6.2.

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## 2. The UK clinical radiology workforce in 2019

Clinical radiology is an essential service that plays a pivotal role in the diagnosis and management of many different conditions; the NHS carries out more than 100,000 imaging examinations across the UK every day.<sup>1</sup>

This section provides an overview of the radiology workforce in September 2019. Information is provided on the size of the workforce and workforce trends, specialisms and the prevalence of less than full-time (LTFT) working.

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## 2.1 Workforce overview

Radiology services in the UK are delivered by teams of consultant clinical radiologists, SAS-grade doctors, radiographers and others. Table 1 shows that there were 4,076 consultant-grade clinical radiologists in post in September 2019. This includes NHS, academic and mixed NHS/academic posts.

**Table 1. Clinical radiology workforce (headcount) – UK countries, 2019**

	England	Northern Ireland	Scotland	Wales	UK total
Consultant grade	3,415	144	347	171	4,076
Specialist trainees	1,355	51	158	72	1,636
SAS grade	77	0	4	3	83
Total	4,846	195	509	246	5,795

*[SAS grade comprises associate specialists, specialty doctors and trust-grade staff.]*

*[Due to rounding, numbers in this table may not add up precisely to the totals provided.]*

Growth in the UK consultant clinical radiology workforce has slowed considerably over the past year; the number of consultant clinical radiologists employed in the UK rose by 149 to 4,076 in the 12 months to September 2019. In comparison, the average annual increase over the past three years (2015–2018) was 203 consultant clinical radiologists. The increase of 149 consultant clinical radiologists is the net effect of 345 consultants joining the workforce and 196 leaving over the past year. Vacancies, recruitment and leavers are discussed in Section 3.

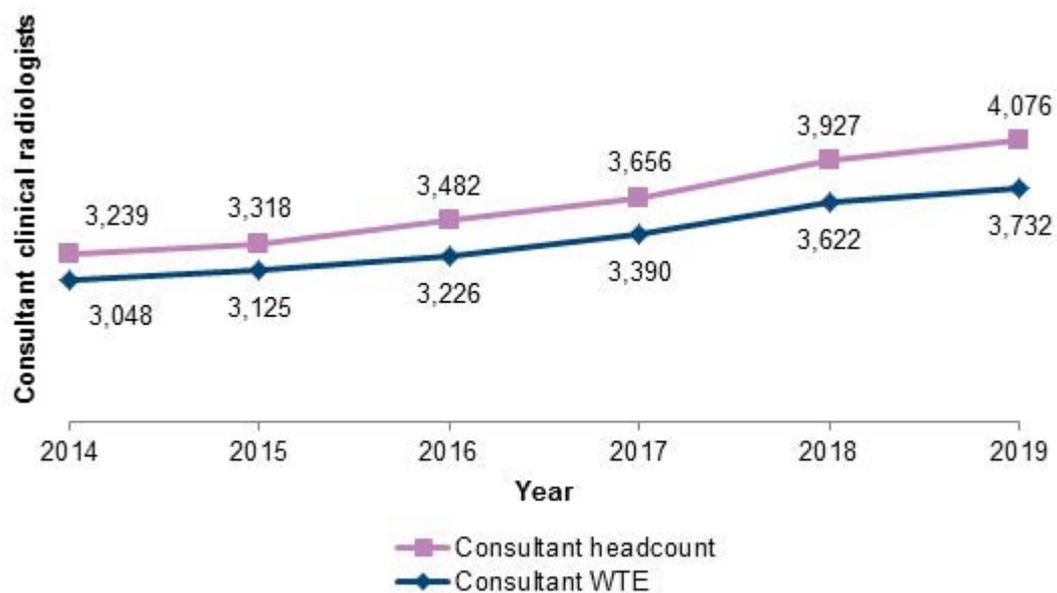
Of the 4,076 consultant clinical radiologists in post in 2019, 94% are employed in substantive posts and 6% in locum posts. The number of locum consultant clinical radiologists has more than doubled over the past two years, from 100 in 2017 (3% of the consultant workforce) to 250 (6% of the workforce) in 2019. Locums are discussed in more detail in Section 3.1.

The vast majority (98%, n=3,994) of consultant clinical radiologists are employed in NHS posts. The remainder (2%, n=83) are employed in academic or mixed NHS/academic posts. Over the past five years, there has been a shift away from academic posts to mixed NHS/academic posts; academic posts have halved (from 51 to 22), while mixed NHS/academic posts have doubled (from 28 to 61). The reduction in academic capacity is concerning given the importance of teaching and research to the advancement of clinical radiology. Research supports improvements in patient care by generating evidence on ways to prevent, diagnose and treat medical conditions more effectively. Teaching and research are essential for best clinical practice.

## 2.2 Consultant workforce: five-year trend

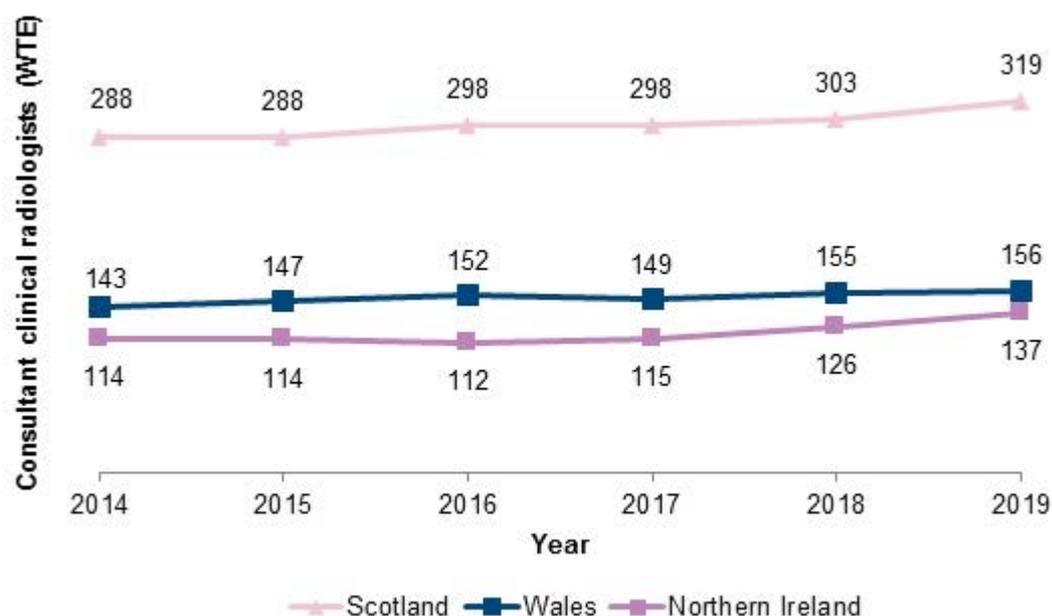
Taking into account contracted hours of LTFT doctors, the UK total of 4,076 consultant clinical radiologists equates to 3,732 WTEs. Over the past five years, as shown in Figure 1, the WTE consultant clinical radiology workforce has grown by an average of 4% per year; however, growth over the past year (to September 2019) slowed to 3%.

Figure 1. Consultant clinical radiology workforce – UK, five-year trend (2014–2019)



Growth in the clinical radiology workforce over the past five years has been variable across the UK. The number of WTE consultant clinical radiologists has increased by an average of 4% (112 WTEs) per year in England. Northern Ireland has seen slightly slower growth over the past five years at an average of 3% per year, while Scotland and Wales have seen the slowest growth at only 2% per year. These results are shown in Figure 2.

**Figure 2. Consultant clinical radiology workforce – devolved nations, five-year trend (2014–2019)**



There is also variability across the UK in terms of the number of WTE consultant clinical radiologists per 100,000 population. The UK average is 5.6, Wales has 5.0 consultant clinical radiologists per 100,000 population, while Northern Ireland has 7.3. England and Scotland are broadly in line with the UK average with 5.6 and 5.9 respectively. These figures are simplistic and give a broad indication of the relative supply of consultant clinical radiologists across UK countries, but do not take into account any local factors which may increase or decrease the need for consultant clinical radiologists.

## 2.3 Programmed activities

A full-time post consists of ten or more programmed activities (PAs), equivalent to a 40-hour working week in England, Northern Ireland and Scotland and a 37.5-hour working week in Wales.

The census data show that, in 2019, full-time NHS consultant clinical radiologists were contracted for an average of 10.8 PAs per week, equivalent to a 43-hour working week, and LTFT consultants were contracted for an average of 6.9 PAs, equivalent to a 28-hour working week. Census data do not show any significant trends of increasing or decreasing contracted hours for full-time consultant clinical radiologists over the past five years.

The census collects data on the following types of PAs:

**Direct clinical care (DCC):** Work directly relating to the prevention, diagnosis or treatment of illness. DCC includes reporting of imaging investigations, participation in clinical meetings, supervision of specialist trainees and carrying out clinical administrative tasks.<sup>7</sup>

DCC, in particular for interventional radiologists, also includes performing image-guided interventions and providing pre- and post-procedure care.<sup>8</sup>

**Supporting professional activities (SPAs):** Activities undertaken to comply with clinical governance and revalidation requirements, including mandatory training, audit and quality improvement, continued professional development and appraisal.<sup>7</sup> SPAs also include activities such as teaching and training.

**Additional programmed activities:** Covers additional responsibilities not undertaken by the generality of consultants, such as those associated with the roles of a clinical or medical director, audit lead or clinical tutor.

The census does not collect data on unpaid hours worked in addition to contracted PAs.

The RCR recommends that the DCC element of the job plan for a full-time consultant should not usually exceed 7.5 PAs and should be balanced by 2.5 SPAs.<sup>7</sup> However, consultant clinical radiologists are under pressure to increase the proportion of their time spent delivering DCC activities. Consequently, contracted DCCs have risen and SPAs have decreased over the past few years. In 2019, full-time NHS consultant clinical radiologists were contracted for an average of 8.7 DCCs and 2.0 SPAs per week; this is equivalent to five hours more DCCs and two hours fewer SPAs per week than the RCR recommendation.

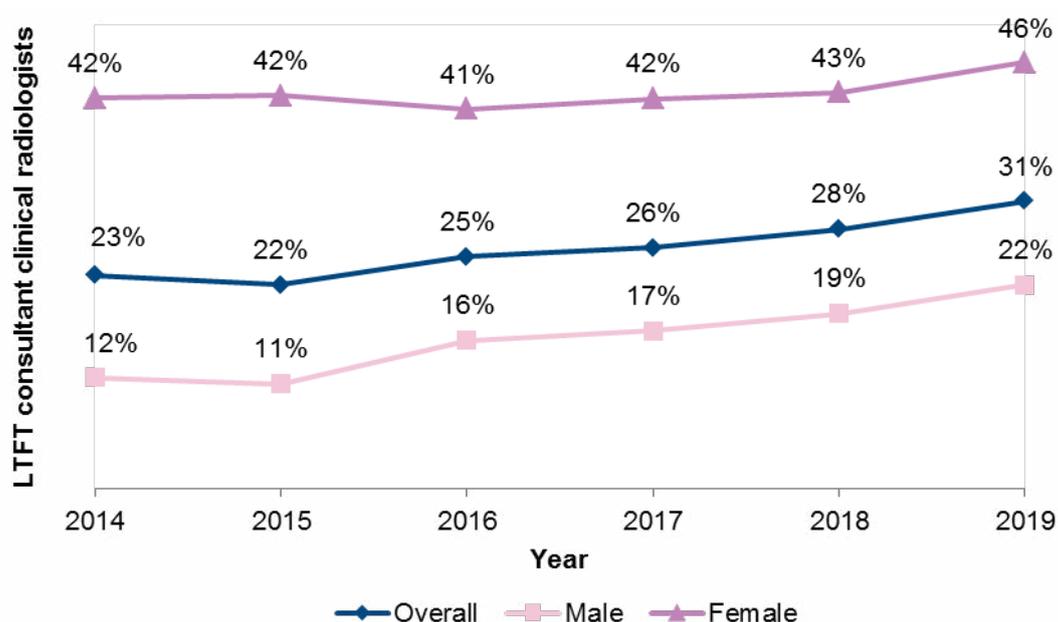
Insufficient SPA time appears to be a problem for LTFT radiologists in particular. In 2019, LTFT NHS consultant clinical radiologists had an average of 1.3 SPAs in their job plans. However, the RCR and Academy of Medical Royal Colleges recommend that consultants' job plans have a minimum of 1.5 SPAs per week.<sup>7,9</sup> This equates to LTFT consultant clinical radiologists having approximately one hour less SPA time per week than the minimum recommended level.

Inadequate SPA time compromises the ability of doctors to keep their knowledge up to date, and to revalidate and undertake audit and quality-improvement activities, which improve services and facilitate better patient outcomes. Furthermore, vacant posts with inadequate SPAs are unlikely to be attractive to potential candidates.

## 2.4 Less than full-time working

LTFT is defined as working fewer than ten contracted PAs per week, equivalent to a 40-hour working week in England, Northern Ireland and Scotland and a 37.5-hour working week in Wales. As shown in Figure 3, LTFT working across the UK has become more common among both men and women over the past five years but remains more prevalent among female consultants. The increase in LTFT working has been particularly notable over the past year; almost half (46%) of female consultant clinical radiologists now work LTFT and nearly a quarter (22%) of male consultant clinical radiologists do so.

**Figure 3. Frequency of LTFT working, consultant clinical radiologists – UK, five-year trend (2014–2019)**



The census did not capture reasons for LTFT working. The 3% increase in LTFT working seen over the past year may be a result of consultant clinical radiologists reducing their hours due to concerns about pension tax penalties.<sup>10</sup> Other motivations for LTFT working are to combine a consultant role with other roles (such as education, research and clinical leadership) and to improve work–life balance.

Workforce planning for clinical radiology must factor in the increasing demand for LTFT working. In 2019, the total UK workforce capacity reduction due to LTFT working equated to 344 WTE consultant clinical radiologists (or 8% of the workforce). Levels of LTFT working are broadly similar across UK countries at between 8% and 9% workforce capacity reduction, except for Northern Ireland, where LTFT working is less prevalent (5%). This is shown in Table 2.

**Table 2. Workforce capacity reduction due to LTFT working, consultant clinical radiologists – UK countries, five-year comparison (2014 and 2019)**

	England	Northern Ireland	Scotland	Wales	UK total
2014	-6% -160 WTEs	-4% -5 WTEs	-6% -19 WTEs	-5% -7 WTEs	-6% -191 WTEs
2019	-9% -294 WTEs	-5% -7 WTEs	-8% -28 WTEs	-9% -15 WTEs	-8% -344 WTEs

*[Workforce capacity reduction = 100% - (WTE consultants/consultant headcount). This takes into account both the frequency and extent of LTFT working.]*

LTFT working in 2019 is more common among the following two groups of consultants:

- Those aged 60 and over – a typical LTFT contract for this age group comprises 22 hours per week (5.6 PAs). This group accounts for one-third of the workforce reduction due to LTFT working.
- Female consultants age 40–60. This age group accounts for one-third of the workforce reduction due to LTFT working.

Given the demand for flexible and LTFT roles, NHS employing organisations should ensure the availability of and support for flexible career options to maximise staff wellbeing and retention. Census data show that full-time clinical radiologists tend to retire two to three years earlier than their LTFT counterparts, indicating that flexible roles may improve staff retention for consultants approaching retirement age.

## 2.5 Specialty areas of practice and interventional radiology

Census respondents were asked to categorise consultant radiologists according to whether they are generalists or specialists. In 2019, approximately three-quarters of consultants (73%) were classified as generalists. Variation was seen across the UK, with generalist radiologists being more common in Northern Ireland, Scotland and Wales (84%–85% of the consultant workforce) than in England (71% of the consultant workforce).

The proportion of specialist radiologists in England has increased gradually over the past five years, from 25% of the consultant workforce in 2014 to 29% in 2019. In comparison, there has been no shift from generalists to specialist consultant radiologists in Northern Ireland, Scotland and Wales, where specialist radiologists account for 15%–16% of the consultant workforce.

The majority of generalists across the UK have one main area of specialty interest (57%), a third have two (33%) and few (10%) have none; these consultants are pure generalists.

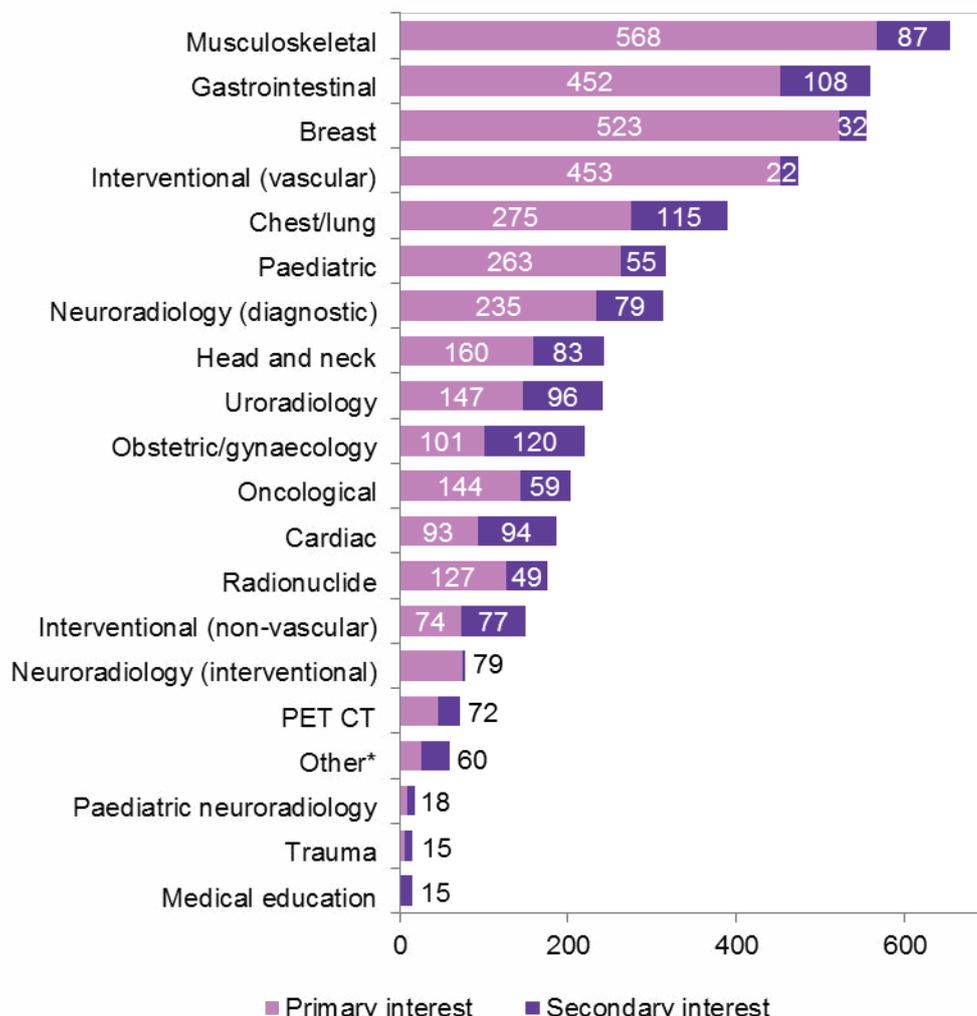
The majority of specialists across the UK have one main area of specialty interest (83%), though some (17%) have two or more areas of specialty interest.

### Specialty areas of practice

The census collects information on consultant clinical radiologists' primary and secondary specialty areas of interest. Figure 4 shows the most common specialty areas of practice. These are musculoskeletal, gastrointestinal, breast, vascular IR and chest/lung. Together, these account for over half (53%) of all specialty interests.

Over the past five years, the clinical radiology workforce has grown (see Section 2.2) and consequently numbers of consultant clinical radiologists with each of the specialty areas of interest have increased. However, workforce growth has been slow for consultant clinical radiologists specialising in breast radiology and vascular IR. As a result, breast radiology has slipped from 13% of all specialty interests in 2014 to 11% in 2019. Similarly, vascular IR has dropped from 12% of all specialty interests in 2014 to 10% in 2019. Combined with the high number of breast radiology and vascular IR vacancies outlined in Section 3.1, this indicates shortages of breast radiologists and vascular interventional radiologists are an area of concern.

**Figure 4. Primary and secondary specialty interests, consultant clinical radiologists – UK, 2019**



[\*Other includes imaging information technology (IT), research, forensic and endocrine radiology.]  
[Frequency of specialty interests exceeds headcount as consultant clinical radiologists indicate both primary and secondary areas of interest, where applicable.]

### Interventional radiology

IR is a recognised subspecialty of clinical radiology. Interventional radiologists perform minimally invasive image-guided procedures in many areas of the body, including providing emergency treatment for patients with bleeding, sepsis and stroke. IR has revolutionised patient care in a wide range of diseases and has replaced or enhanced many surgical procedures. The benefits of IR typically include faster recovery times, shorter hospital stays and reduced morbidity and mortality.<sup>11</sup> However, with ongoing workforce shortages, IR provision remains patchy. Many hospitals have limited or, in some instances, no direct access to IR services. This is unsafe and puts patients at risk.

The 2019 census data show the following types and numbers of interventional radiologists currently practising, summarised in Table 3.

- 462 (WTE) consultant vascular interventional radiologists (12% of the UK consultant radiology workforce).<sup>b</sup>
- 128 (WTE) consultant non-vascular interventional radiologists (3% of the UK consultant radiology workforce).<sup>c</sup>
- 76 (WTE) consultant interventional neuroradiologists (2% of the UK consultant radiology workforce).<sup>d</sup>

In addition, in the majority (80%–90%) of UK trusts/health boards diagnostic radiologists perform a limited range of image-guided IR procedures, including biopsies and drainages.

Women are under-represented in the subspecialty of IR; census data indicate that only one in ten consultant interventional radiologists are women (11%) in the UK in 2019, compared with four in ten consultant diagnostic radiologists (41%).

**Table 3. Primary or secondary interest in vascular, non-vascular or neuro IR, WTE consultant clinical radiologists – UK, 2019**

	Vascular IR	Non-vascular IR	Neuro (mainly IR)	Total
England	398	113	71	582
Northern Ireland	13	3	2	18
Scotland	31	7	2	40
Wales	19	6	1	26
UK total	462	128	76	666

*[Due to rounding, numbers in this table may not add up precisely to the totals provided.]*

There is wide variability across the UK in terms of the number of consultant interventional radiologists per million population. Such figures are simplistic and do not account for national differences in demand or working practices; however, they do give a broad indication of the relative supply of consultant interventional radiologists across UK countries. While England and Northern Ireland have ten IR consultants per million population, Wales has eight and Scotland only seven.

*b Vascular procedures are those undertaken on arteries, veins and the lymphatic system, for example to stop bleeding (haemorrhage), treat narrowing of arteries (vascular disease), treat enlargement/expansion of blood vessels (aneurysms) or treat blood clots and blocked veins.*

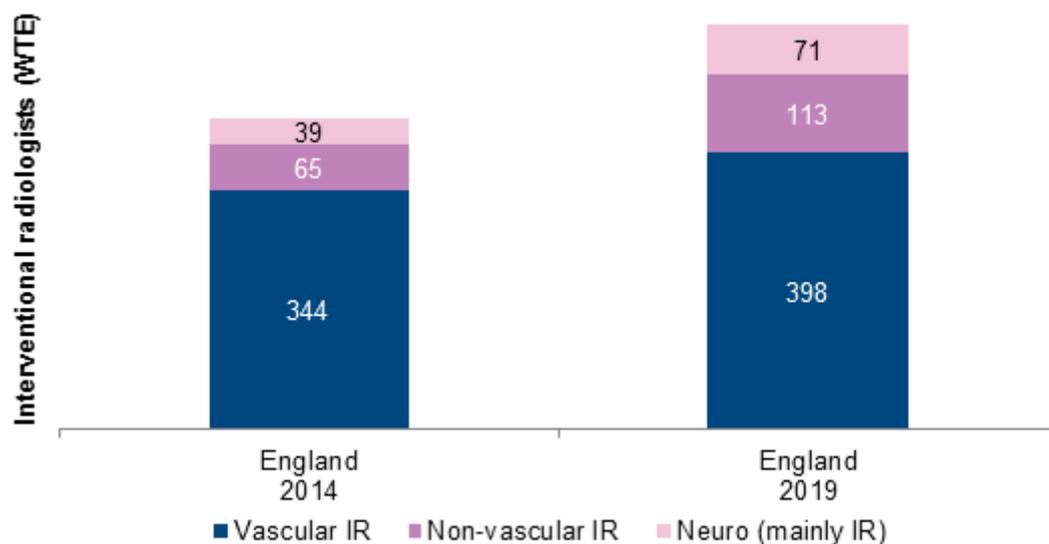
*c Non-vascular intervention includes treatment of non-vascular conditions (including urgent treatment to control sepsis) and cancer.*

*d Interventional neuroradiologists undertake minimally invasive procedures in the brain and spinal cord, for example to treat strokes.*

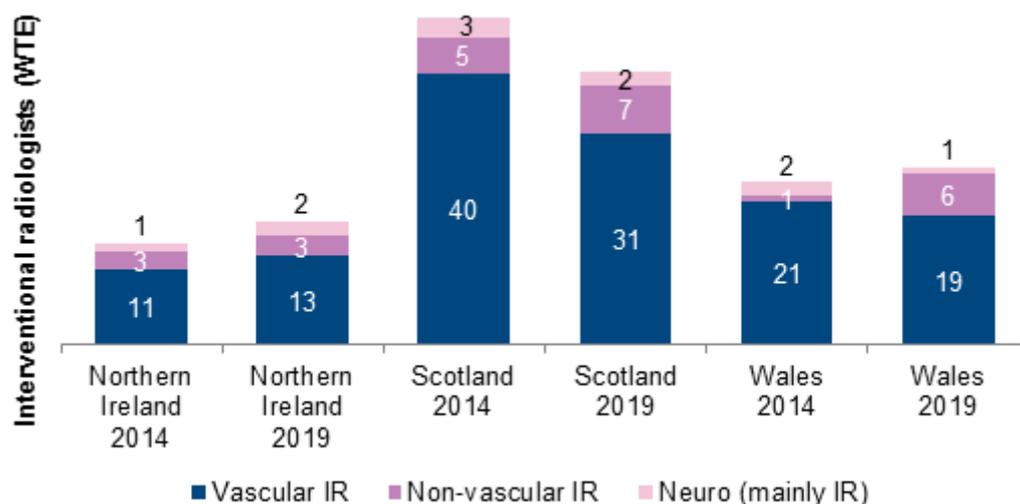
Growth in the UK IR workforce has slowed considerably over the past year. The UK IR workforce grew by only four WTE IR consultants in 2019, equivalent to 1% growth. This is much lower than the 4% average growth (equivalent to 24 WTE IR consultants) per year seen over the previous five years (2014–2018).

Rates of growth of the IR workforce vary across the UK. This is shown in Figure 5 and Figure 6. In England, the IR workforce has grown by an average of 5% per year over the past five years, which is slightly higher than the 4% per year growth in the total consultant clinical radiology workforce. In contrast, growth in Northern Ireland and Wales has been slower, and there has been no IR workforce growth at all in Scotland. In fact, in Scotland there are fewer interventional radiologists than five years ago, with numbers of consultant vascular and neuro IRs leaving the Scottish workforce outnumbering those joining. Combined with the low number of radiologists per million population, this indicates that the shortage of interventional radiologists is particularly severe for patients in Scotland.

**Figure 5. Primary and secondary interest in IR, WTE consultant clinical radiologists – England, five-year comparison (2014 and 2019)**



**Figure 6. Primary and secondary interest in IR, WTE consultant clinical radiologists – Northern Ireland, Scotland and Wales, five-year comparison (2014 and 2019)**



For the safety of patients, guidelines recommend that, regardless of geography and hospital size, timely access to IR should be available.<sup>4</sup> Services consisting of a minimum of six interventional radiologists will usually be able to provide an effective and sustainable 24-hour IR service. However, services covering populations of more than one million will likely require eight or more interventional radiologists.<sup>11</sup>

Almost half of trusts/health boards (46%, n=79) did not provide adequate 24/7 IR services in 2019.

- One in five trusts/health boards (18%, n=31) had a 24/7 IR rota comprising fewer than the recommended minimum of six IRs.
- More than a quarter of UK trusts/health boards (28%, n=48) did not operate a 24/7 IR rota and did not have formal networked arrangements in place to transfer patients for IR procedures either.

These data are shown in Figure 7.

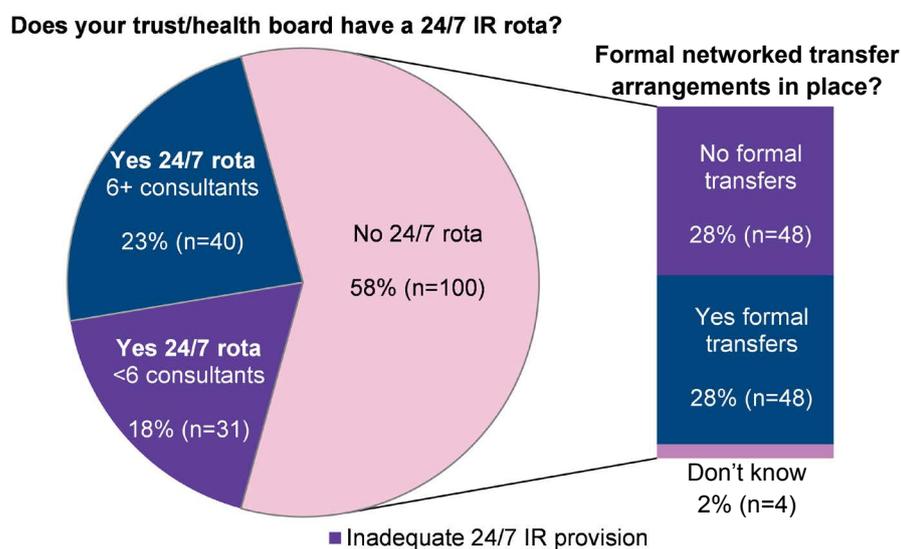
The current lack of 24/7 IR services creates an unacceptable risk for patients; for example, clinical trials have shown that if eligible patients with acute stroke are rapidly treated with mechanical thrombectomy (an interventional procedure), their prospects for independent recovery are significantly improved.<sup>12,13</sup>

Several clinical directors of imaging departments expressed concern regarding their IR service provision, for example:

- *'Our IR [service is] on the verge of collapsing. [We have been] unable to recruit for approximately seven years.'*
- *'Due to a shortage of IR radiologists, our on-call IR service was withdrawn.'*
- *'Our out-of-hours IR service is dependent on goodwill.'*

The principal causative factor of inadequate 24/7 IR services is insufficient numbers of trained interventional radiologists. See section 5.2 for the estimated shortfall.

**Figure 7. Frequency of 24/7 IR rotas and formal transfer arrangements for IR procedures – UK trusts and health boards, 2019**



## Administration of Radioactive Substances Advisory Committee (ARSAC) licence holders

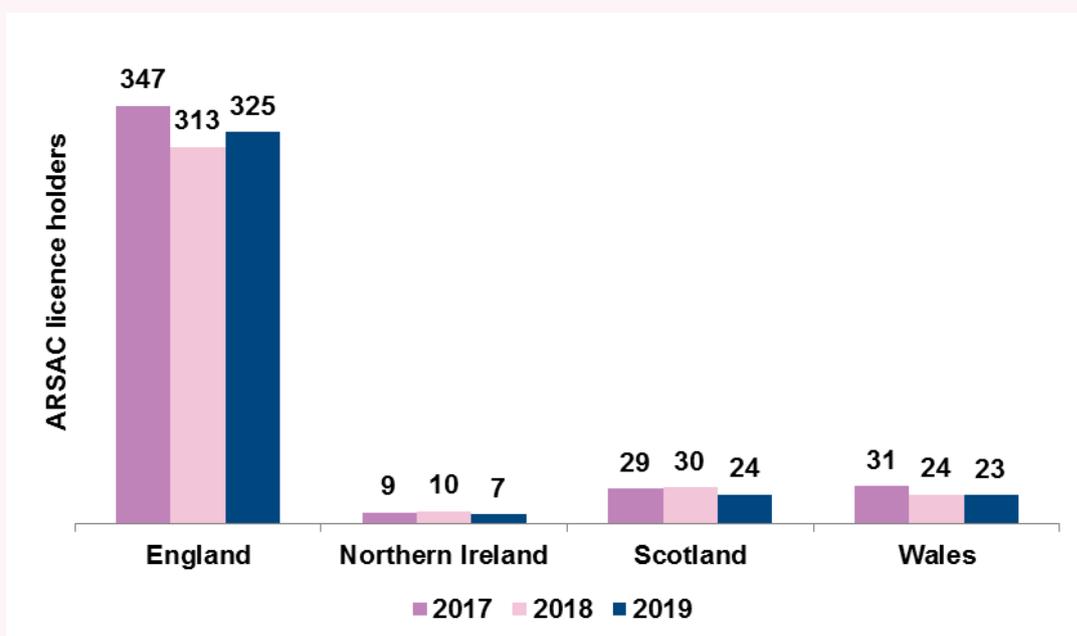
Practitioners, such as consultant clinical radiologists and nuclear medicine physicians, must hold an ARSAC licence to clinically justify exposures involving the administration of radioactive substances for diagnosis, treatment or research. The census collected data on the numbers of ARSAC licence holders employed by each trust or health board as of 1 September 2019. Results are shown in Figure 8. Over the past year, the number of ARSAC licences has remained stable, with 273 radiologists and 100 nuclear medicine physicians holding ARSAC licences in 2019. However, census data show a 9% decline in the number of ARSAC licences between 2017 and 2018, possibly due to the new ARSAC licensing system introduced in 2018.

There is an uneven distribution of ARSAC licences across the UK. Census data suggest possible shortages of ARSAC licence holders in some countries and regions; for example, Northern Ireland and Scotland both have far fewer licences per consultant radiology workforce and per head of population, than England and Wales.

Single-photon emission computed tomography (SPECT) and positron emission tomography (PET-CT) scans are two of the most commonly used imaging techniques in nuclear medicine; they are increasingly used in the diagnosis of disease. In England, SPECT imaging examinations have increased by an average of 23% per year over the past five years and PET-CT imaging examinations by an average of 19% per year.<sup>1</sup>

To ensure that patients continue to benefit from nuclear medicine techniques and developments, trusts and health boards must ensure succession plans for ARSAC licence holders are in place, in particular for those approaching retirement age.

**Figure 8. ARSAC practitioner licence holders – UK countries, 2017–2019**



### 3. Vacancies, recruitment and leavers in 2019

Census data indicate increased difficulty for UK radiology departments in recruiting the consultant clinical radiologists they need, with insufficient trainees, a lack of suitable UK candidates and challenges of recruiting from overseas cited as key barriers.

#### 3.1 Vacancies

The census data show there were 466 vacant consultant clinical radiologist posts in the UK in September 2019. This is the highest number of vacancies reported over the past five years and equates to a vacancy rate of 11%. Table 4 shows that the 2019 vacancy rates were broadly similar across UK countries at between 10% and 12%, except for Northern Ireland, with a vacancy rate of 16%.

**Table 4. Vacancies and vacancy rates, consultant clinical radiologist posts – UK, 2019**

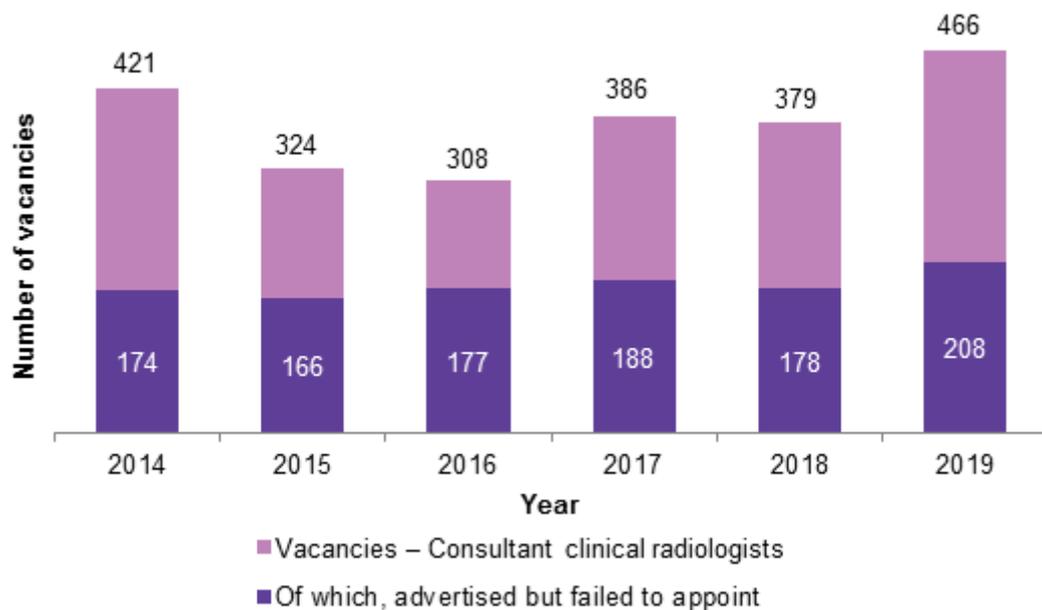
	England	Northern Ireland	Scotland	Wales	UK total
Vacancies	383	27	35	21	466
Vacancy rate	11%	16%	10%	12%	11%

Clinical director feedback indicates that vacancy numbers reported through the annual census significantly underrepresent the true extent of clinical radiology workforce shortages. Clinical directors highlighted the following four reasons:

- **Funding restrictions:** *'[We currently have] four funded vacancies, but demand and capacity analysis indicated the need for a minimum of seven [additional consultant clinical radiologists].'*
- **Lack of suitable candidates:** *'[We currently have] no substantive vacancies, but could create up to six posts if radiologists were available.'* Another stated, *'These vacancies have been intermittently advertised, but no qualified applicants have been appointed ... so these funded posts have been used to recruit to Clinical Fellows.'*
- **Outsourcing:** *'Although currently no vacancies are in the established budget, the increase in demand and complexity has meant backlogs and outsourcing for reporting. We are making the case for an increase in the establishment of WTE radiologists.'*
- **Time lag:** *'Our activity and workforce review suggested the need for two to four additional radiologists. However, that is still being discussed [and is awaiting] financial approval and therefore has not been included here as active recruitment.'*

Consultant clinical radiologist vacancies are frequently challenging to fill. In 2019, just under half (45%) of reported vacancies had been advertised but not successfully filled, indicating a lack of suitable candidates. This is shown in Figure 9, together with five-year trend data.

**Figure 9. Status of consultant clinical radiologist vacancies – UK, five-year trend (2014–2019)**



Most vacant posts have remained unfilled for long periods. Figure 10 shows the period for which consultant clinical radiologist posts have remained unfilled in 2019; six in ten (59%) of the 466 vacancies remained unfilled for a year or more.

**Figure 10. Vacancies, period unfilled, consultant clinical radiologist posts – UK, 2019**

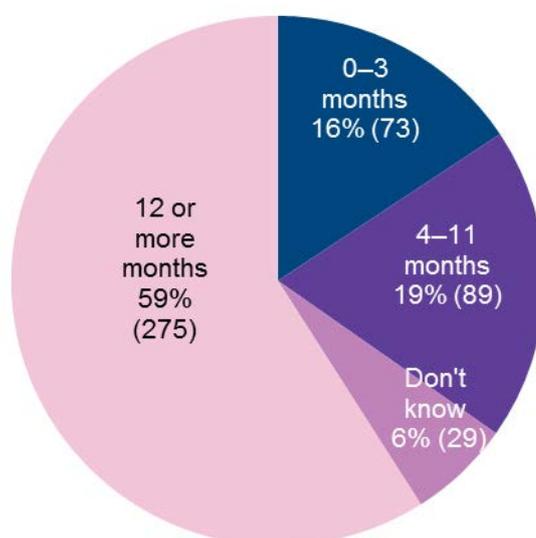


Table 5 shows the primary specialty interests sought for vacant consultant posts and also the vacancy rate for generalist radiologists. These data indicate a severe shortage of generalist radiologists, with 95 vacancies and a vacancy rate of 27%.

However, the data also indicate workforce shortages across most specialty interests; the majority have a vacancy rate of 10% or higher. Paediatric neuroradiology has the highest vacancy rate at 39%.

Vascular IRs and breast radiologists were the specialists most in demand in 2019 (with 48 and 47 vacancies respectively), as was the case in 2018, indicating a continued shortage of consultant clinical radiologists specialising in these areas.

**Table 5. Primary interest sought for vacant consultant clinical radiology posts – UK, 2019**

Primary interest	Vacancies	Vacancy rate
Interventional radiology (vascular)	48	10%
Breast radiology	47	9%
Musculoskeletal radiology	42	7%
Paediatric radiology	35	13%
Gastrointestinal radiology	33	7%
Chest/lung radiology	32	11%
Head and neck radiology	22	13%
Neuroradiology (mainly diagnostic)	22	8%
Uroradiology	18	12%
Oncological radiology	17	11%
Interventional radiology (non-vascular)	13	16%
Obstetric/gynaecology radiology	11	11%
Neuroradiology (mainly interventional)	5	6%
Paediatric neuroradiology	5	39%
Radionuclide radiology	4	3%
Cardiac radiology	4	4%
PET CT	4	9%
N/A Generalist (or flexible/not known)	95	27%
Other*	9	24%
Total	466	11%

[\*Other includes imaging information technology, research, trauma and forensic radiology.]

### Locum cover for vacant posts

Census respondents reported that the primary reason for employing locum consultant clinical radiologists, accounting for three-quarters of appointments in 2019, was to cover vacant positions. The number of locums increased from 100 in 2017 (3% of the workforce) to 250 (6% of the workforce) in 2019. However, even with this substantial increase, only four in ten (40%, n=187) of the 466 consultant clinical radiologist vacancies reported in 2019 were covered by locums, despite the majority of vacancies (59%) remaining unfilled for 12 months or more.

*[Other reasons given for the employment of locums (accounting for 25% of appointments) are to manage ad hoc shortfalls in reporting capacity and to provide cover for maternity leave or long-term sickness.]*

### 3.2 Recruitment from the UK and overseas

Census data show that 345 consultant clinical radiologists were recruited to the workforce over the past year (to September 2019). Half of the new appointments (51%, n=177) were clinical radiologists who had completed their specialist training in the UK. The other half comprised clinical radiologists who undertook their specialist training overseas (40%) and those who were previously working in UK SAS or research fellow posts (3%). The origin of 5% of consultants is not known.

#### Overseas recruitment

With insufficient supply from UK specialist training to fill vacant posts, radiology departments are increasingly turning to overseas recruitment to reduce workforce shortages. This is despite clinical directors reporting that overseas recruitment is often a challenging, expensive and slow process. In 2019, six in ten UK trusts/health boards attempted overseas recruitment, compared with four in ten UK trusts/health boards a few years previously in 2015.

Success with overseas recruitment was variable across UK countries. Trusts in England mostly reported some success with overseas recruitment attempts; among those who attempted overseas recruitment, four in five (80%) trusts were successful in some (or all) instances. In contrast, trusts in Northern Ireland reported great difficulty with overseas recruitment; while three Northern Ireland trusts attempted overseas recruitment in 2019, only one reported success.

With increased overseas recruitment, the composition of the consultant clinical radiology workforce is gradually changing: two-thirds (67%) of consultant clinical radiologists reported in the 2019 census undertook their medical degree in the UK. This is fewer than the three-quarters (73%) of consultants who graduated from UK medical schools reported in the 2014 census.

Census data show that overseas recruitment is primarily from countries outside of the European Economic Area (EEA), with doctors who graduated from medical school in India accounting for approximately 30% of clinical radiology overseas recruitment in 2019.

Even though 2019 saw increased success rates for overseas recruitment, several radiology departments commented on the difficulties they experienced when recruiting from overseas.

### Trusts and health boards highlighted many barriers to overseas recruitment:

- **UK working practices:** *'Often the challenge is learning ways of the NHS, rather than the academic aspects of radiology.'*
- **Trust processes:** *'We tried to recruit a doctor from Pakistan, but the recruitment process was not successful due to convoluted HR processes within our trust.'*
- **Financial cost:** *'Monetary costs for relocation [are high], especially if doctors fail to commit to a significant period of time.'*
- **Skills availability:** *'[It is] difficult to recruit from overseas, especially for intervention, as skills can be variable.'*
- **Political uncertainty:** *'[There are] uncertainties due to Brexit and change of policies.'*
- **Visa processes:** *'[The candidate's] visa [application] got rejected.'*
- **Longer timeframes:** *'Extra time [is] required when employing and supporting non-UK-trained radiologists.'*
- **English language requirements:** *'One candidate failed [the] English exam on multiple occasions.'*
- **Ethical concerns:** *'We cannot/should not rely on stripping developing countries of their best and brightest staff.'*

### 3.3 Retirement and other leavers

In the 12 months to September 2019, 196 consultant clinical radiologists (equivalent to 161 WTEs) left the workforce, equal to 4% attrition. While numbers leaving the workforce vary from year to year and associated attrition rates vary from one year to the next, the general trend over the past five years has been one of increased numbers of leavers each year and increased attrition rates.

#### Retirements

The most frequently cited reason for consultants leaving is retirement. Table 6 shows the median retirement age over the past five years. The median age of retirement in 2019 was 60.

**Table 6. Median retirement age, consultant clinical radiologists – UK, five-year trend (2014–2019)**

	2014	2015	2016	2017	2018	2019
Median age	61	60	60	62	61	60

*[In the context of the RCR census, retirement means retiring from working as a clinical radiologist permanently.]*

Improving staff retention should be a priority given current workforce shortages. However, the trends seen in the 2019 clinical radiology census of early retirement and increasing attrition rates reflect trends seen across the NHS medical workforce.<sup>14</sup> There has been no improvement in NHS staff retention over the past year. This indicates that, at a national level,

strategies for improving retention of consultant clinical radiologists and other NHS staff are not yet having any noticeable impact.

Key factors that influence consultants' decisions on whether to retire early from NHS work are work–life balance and concerns about pension tax penalties.<sup>10,15</sup>

## 4. Workforce supply – five-year forecast

The size of the radiology workforce is impacted by entrants from UK specialist training and by recruitment from overseas, set against attrition from radiologists leaving the profession. The trend towards increased LTFT working also affects workforce capacity.

### 4.1 Supply from UK specialist training

An adequate supply of UK trainees is vital to address UK clinical radiology workforce shortages. Unfortunately, RCR census and training data indicate there are several factors that have reduced this supply of applicants for consultant posts in recent years. These include:

1. **Approximately 12%** of those who completed their specialist training in clinical radiology in the UK and gained a Certificate of Completion of Training (CCT) over the five-year period 2008–2013 **have not taken up a UK consultant post**. Of the 12%, more than half appear to have moved overseas to work.
2. **Increased numbers of CCT holders choose to delay taking up UK consultant posts**. Census and training data show that, in 2019, trainees start their specialist training in clinical radiology at (median) age 28 and take up their first consultant clinical radiologist post at (median) age 36.
3. **The average length of time taken to complete specialist training in clinical radiology in the UK has gradually increased**. RCR training data show that trainees who gained a CCT over the past five years (2014–2019) took an average of five years and nine months to complete their specialist training, four months longer than those who gained a CCT in the preceding five years (2008–2013). This is shown in Table 7.

**Table 7. Average length of clinical radiology specialist training – UK, ten-year trend (2008–2019)**

Time period	Full-time	LTFT	Overall
2008–2013	5 years 2 months	7 years 1 month	5 years 5 months
2014–2019	5 years 4 months*	7 years 4 month	5 years 9 months
Difference	+ 2 months	+ 3 months	+ 4 months

*[\*Table 7 excludes clinical radiology specialist trainees who undertake extended training for IR. Full-time trainees take an average of six years and one month to complete specialist training in interventional and clinical radiology. Very few IR specialist trainees (3%) train LTFT.]*

4. **There has been a gradual increase in the number of LTFT trainees**. In the past five years, on average 18% of trainees were LTFT (at the point of completing their training) compared with 15% in the preceding five years.

5. **Supply in some regions has been hindered** by the strong tendency for clinical radiology trainees to take up consultant posts in the region where they undertook their specialist training.

Specialist training places in clinical radiology have increased across the UK by approximately 25% over the past five years. Consequently, over the next five years, numbers of UK-trained newly appointed consultant clinical radiologists are expected to rise by a similar level (assuming no significant changes in attrition rates). Based on RCR training and census data, the number of UK-trained consultant clinical radiologists who will join the workforce in the next five years is estimated to be an average of 198 WTE consultants per year, as shown in Table 8.

The forecast annual supply from UK specialist training (of 198 newly appointed WTE consultant clinical radiologists) is insufficient to fill even half of the 466 consultant vacancies reported in 2019 (see Section 3.1), let alone cover shortfalls from radiologists leaving the profession.

**Table 8. Estimated training completions (CCTs) and subsequent appointments to UK consultant clinical radiologist posts – UK, next five years (to 2024)**

UK nation	Estimated CCTs*	Estimated subsequent consultants**	Estimated WTE consultants***
England	1,026	903	822
Northern Ireland	39	34	33
Scotland	119	105	96
Wales	52	46	42
2020–2024 UK total	1,236	1,088	992
2020–2024 UK average per year	247	218	198

[Due to rounding, numbers in this table may not add up precisely to the totals provided.]

[\*CCTs based on:

1. Trainee numbers (September 2019)
2. The average length of training of five years and nine months and the average trainee attrition rate of 10%.

\*\*Estimated post-training attrition rate of 12% (UK average) is based on a comparison of RCR training data with census data over the five years 2013–2018.

\*\*\*Based on the current scale of LTFT working in each UK nation (see Section 2.4).]

## 4.2 Supply from overseas recruitment

Migration makes an essential contribution to the radiology workforce, and the *NHS Long Term Plan* acknowledges that overseas recruitment will remain vital to achieving overall staffing numbers needed in the NHS.<sup>2</sup> Census data show that, over the five-year period 2012–2017, approximately 100 WTE consultant clinical radiologists who undertook their specialist training outside of the UK were recruited to UK NHS consultant posts each year. However, census data have shown a marked increase in overseas recruitment over the past two years, with 135 WTE consultant clinical radiologists recruited from overseas in 2019.

It is estimated that approximately 675 WTE consultant clinical radiologists will be recruited from overseas to substantive posts in the UK by 2024, assuming that the current rate of overseas recruitment remains constant.

## Other recruitment

There is supply, albeit much smaller, through different routes to the UK consultant clinical radiology workforce. This group comprises those who return to practice after taking time out and those qualifying via the Certificate for Eligibility for Specialist Registration (CESR) route, such as doctors previously working in SAS-grade roles. This supply is estimated to total approximately 70 WTEs in the next five years, in line with the previous five years.

## 4.3 Retirement scenarios

On the assumption that the median retirement age remains unchanged at 60 years (see Section 3.3), an estimated 731 WTE consultants (20% of the current consultant workforce) are expected to retire in the next five years. This level of attrition will put considerable additional strain on the workforce. In addition, older consultants have considerable experience, knowledge and expertise and represent a valuable source of training and mentoring for more junior doctors.

The following scenarios demonstrate the potential positive impact of retention strategies on workforce attrition, summarised in Table 9.

**Table 9. Effect of retention strategies/retirement age, next five years**

	Age of retirement	Consultant retirements, next five years (to 2024) (estimated WTEs)
Scenario 1	60 years	731
Scenario 2	65 years	293 (438 fewer than scenario 1)
Scenario 3	65 years plus all consultants age 60–64 working LTFT	476 (255 fewer than scenario 1)

**Scenario 1:** Median age of retirement remains at 60 representing no change from 2019.

**Scenario 2:** If consultant clinical radiologists are incentivised to continue work on their current contracted hours and retire at the age of 65, this will more than halve the number of retirements, with estimated retention of 438 WTE consultants (compared with the current situation, Scenario 1).

**Scenario 3:** If consultants are incentivised to work on LTFT contracts of six PAs (equivalent to a 24-hour week) from age 60 and retire at the age of 65, this will reduce retirements by a third, with estimated retention of 255 WTE consultants (compared with the current situation, Scenario 1).

### Other leavers

Assuming the annual attrition rate of 1% for other leavers (that is, all leavers excluding retirements) observed over the past five years remains unchanged, attrition in the next five years for this cohort is estimated to total approximately 230 consultants (WTEs).

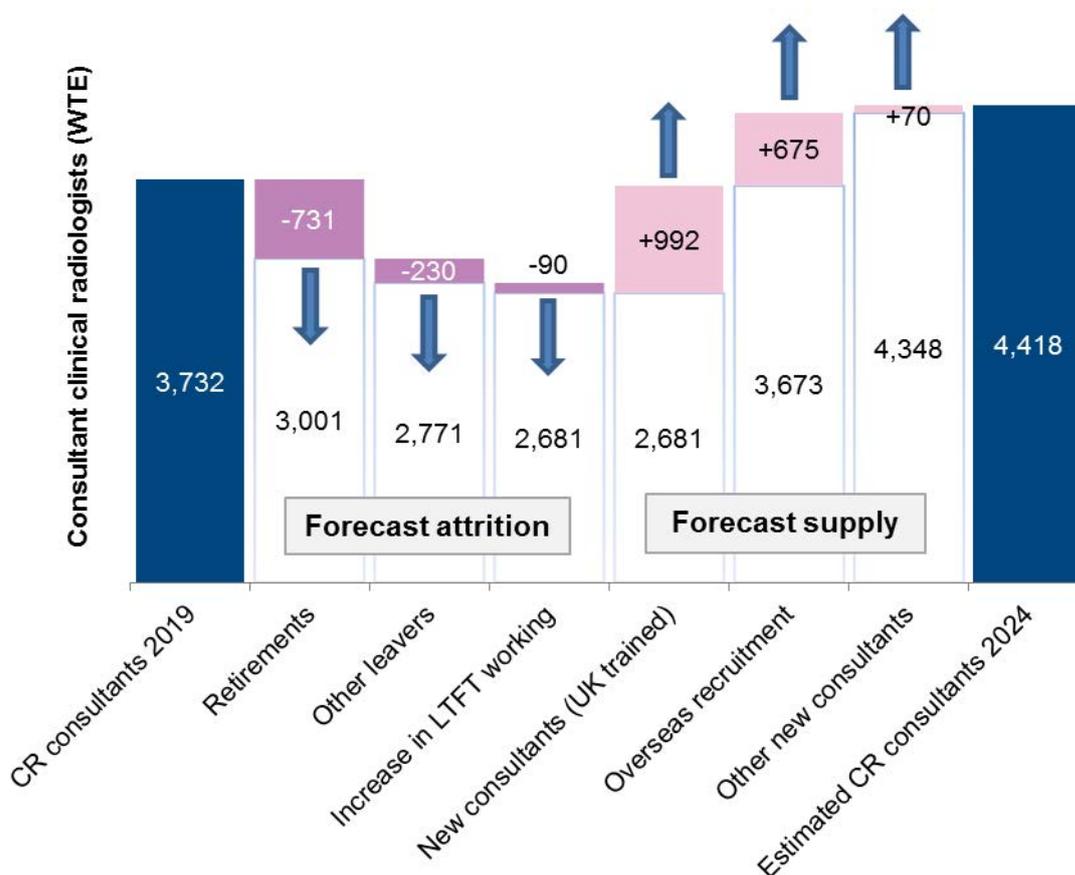
### 4.4 Less than full-time working

The UK consultant clinical radiologist workforce capacity loss due to LTFT working has increased from 6% (191 WTEs) in 2014 to 8% (344 WTEs) in 2019 (see Section 2.4). If this trend continues linearly, the effect will equate to an additional 2% workforce capacity loss, or approximately 90 fewer consultant clinical radiologists (WTEs) by 2024.

#### 4.5 Workforce forecast illustrated – next five years

Bringing together the forecasts outlined in the previous sections (4.1 to 4.4), Figure 11 illustrates the estimated supply and attrition over the next five years (2019–2024). There will be an estimated 4,418 WTE consultant clinical radiologists in post in the UK in five years (2024), equivalent to a 3% annual increase. Growth is, therefore, forecast to slow down from the 4% per year seen over the past five years.

**Figure 11. Estimated supply of WTE consultant clinical radiologists – UK, next five years (2019–2024)**



#### IR forecast next five years

There will be an estimated 771 WTE consultant interventional radiologists in post in the UK in five years (2024), equivalent to a 3% annual increase. Growth is forecast to slow down from the 4% per year seen over the past five years, based on the following estimates of supply and attrition.

#### IR supply

Census data show that 270 WTE consultant interventional radiologists were recruited to the workforce over the past five years. Seven out of ten new appointments (69%, n=186) were

clinical radiologists who had completed their specialist training (in clinical and IR) in the UK. The other three in ten comprised clinical radiologists who undertook their specialist training overseas or qualified through other routes (31%, n=84).

The forecast is for 270 WTE consultant interventional radiologists to join the UK consultant IR workforce over the next five years (to 2024). This assumes trends seen over the past five years remain constant, with approximately 17 appointments from overseas per year and around 37 appointments per year following UK specialist training.

### IR attrition

Over the past five years, 125 WTE consultant interventional radiologists (net) left the UK workforce, equal to attrition of approximately 4% per annum. This is forecast to rise to over the next five years as follows.

- **Retirements:** 132 WTEs (based on the average age of retirement of consultant clinical radiologists of 60 years).
- **Other leavers:** 33 WTEs (1% per annum).

An average of 33 WTE consultant interventional radiologists are forecast to leave the UK workforce each year for the next five years.

## 4.6 Forecast shortage of specialists

Early retirement results in increased workforce shortages and the loss of valuable experience, knowledge and expertise.

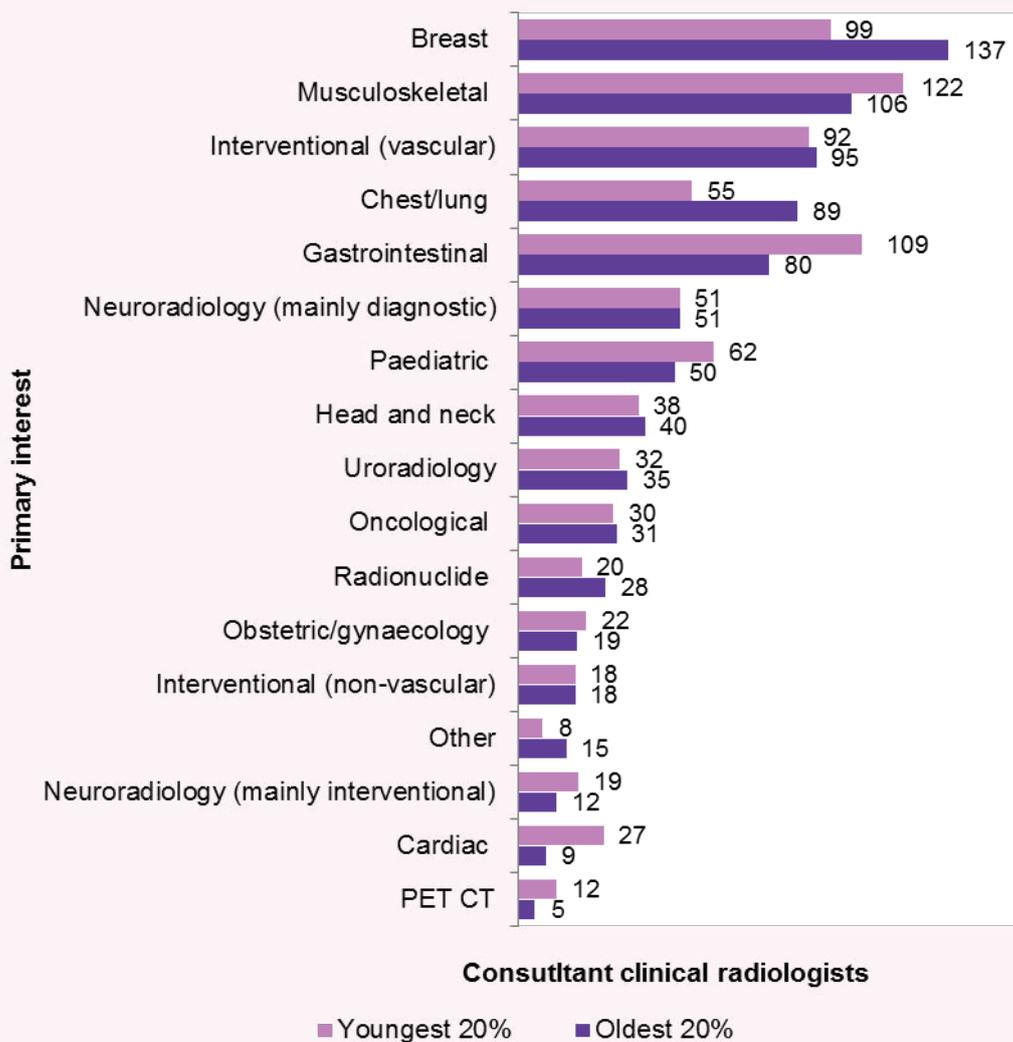
As a means of highlighting potential shortages of specialist radiologists in coming years, Figure 12 shows the primary area of interest of the youngest 20% and the oldest 20% of consultant clinical radiologists as of 2019.

These data show there is likely to be an increased shortage of the following specialists over the coming five years, assuming consultant clinical radiologists retire at the median age of 60 (see Section 3.3).

- **Breast specialists:**
  - One in four trusts/health boards across the UK have at least one vacant consultant breast radiologist post (see Section 3.1).
  - This is forecast to increase as one in four consultant clinical radiologists with a primary interest in breast radiology (26%, n=134) are forecast to retire over the next five years.
  - There appears to be a shortage of younger consultant clinical radiologists specialising in breast radiology to close the gap between supply and demand. As shown in Figure 12, four breast radiologists are forecast to leave the workforce over the next five years for every three that join.
- **Chest/lung specialists:**
  - Approximately, one in five trusts/health boards across the UK have at least one vacant consultant chest/lung radiologist post (see Section 3.1).
  - This is forecast to increase as one-third of consultant clinical radiologists with a primary interest in chest/lung radiology (31%, n=86) are forecast to retire over the next five years.
  - There appears to be a shortage of younger consultant clinical radiologists specialising in chest/lung radiology to close the gap between supply and demand.

As shown in Figure 12, three chest/lung radiologists are forecast to leave the workforce over the next five years, for every two that join.

**Figure 12. Primary area of interest, oldest and youngest consultant clinical radiologists – UK, 2019**



[‘Other’ includes the following: paediatric neuroradiology, imaging IT, trauma, research and forensic radiology.]

## 5. Demand for radiology services

Medical imaging is used to diagnose and monitor medical conditions and is an integral part of numerous medical pathways. Consultant clinical radiologists provide expert guidance to other clinicians regarding diagnostic imaging tests, interpret and report medical images and attend multidisciplinary team meetings (MDTMs) to discuss complex cases and cancer cases. Consultant interventional radiologists perform minimally invasive image-guided procedures in many areas of the body. IR is increasingly used in place of surgical procedures.

The clinical radiology workload has risen steadily every year over the past decade. This is a result of:

- Demand for diagnostic imaging, driven by:
  - **Population increases**
  - **An aging population** with increased long-term disease incidence. Around one in every five people were 65 years or over in 2018 (18%) and this is projected to reach around one in every four people (24%) by 2038.<sup>16</sup> This is significant as older patients are much more likely to need radiology services; for example, the rate of X-ray and CT imaging examinations increases markedly with age.<sup>17</sup>
  - **Increased screening** to support early diagnosis initiatives.
  - **New and updated clinical guidelines** which specify imaging as part of the clinical pathway.
- **Technological advances.** The complexity and diversity of imaging have significantly increased. Whereas an X-ray examination may result in a couple of images for a single patient, often magnetic resonance imaging (MRI) and CT machines generate hundreds or thousands of images for a single patient.
- **Demand for IR procedures.** The range of diseases and organs amenable to IR is extensive, and the scope and complexity of IR procedures continue to increase.
- **Demand for radiology clinical input** to support patient care, for example through MDTMs. The 2019 census data show that consultant clinical radiologists spend an average of four to five hours preparing and attending MDTMs in a typical week.
- **Demand for teaching, supervision and mentoring** of clinical radiology specialist trainees, SAS-grade doctors and other staff.

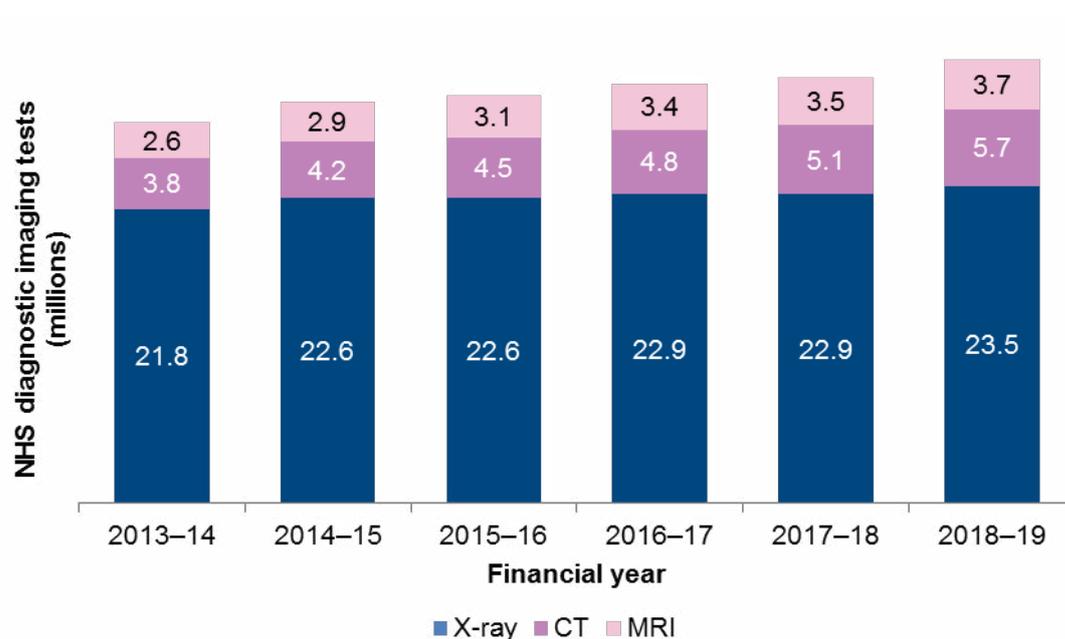
### 5.1 Demand for diagnostic radiologists

Imaging activity has been growing steadily over many years. For example, growth over the past five years (across all modalities) has averaged 4% per year in England.<sup>1</sup> Demand for complex imaging, which is more consultant-intensive, has increased at a faster rate.

Three of the most common diagnostic imaging tests carried out on NHS patients in the UK are X-ray, CT and MRI. In England alone, in the year to March 2019, 33 million such imaging tests were carried out.<sup>1</sup> Imaging volumes by modality are shown in Figure 13.

Over the past five years, there has been growth of more than three million CT and MRI imaging examinations carried out in England. Demand for CTs has increased by 10% and demand for MRIs by 8% over the past year (in contrast with 2% growth in X-rays).<sup>1</sup> These more complex modalities play a vital role in the diagnosis and monitoring of many medical conditions and are now used routinely in many patient pathways. However, the resultant imaging takes much longer to interpret and report than X-rays; while X-rays typically take one or two minutes to report, complex CTs and MRIs can take up to an hour to report.<sup>18</sup>

**Figure 13. NHS imaging activity – England, five-year trend (2013/14–2018/19)<sup>1</sup>**



[Scotland imaging data show that demand for complex imaging has increased by 6% over the past year.<sup>19</sup> Imaging data for Northern Ireland and Wales was not available at the time of publication.]

Table 10 estimates the total number of consultant clinical radiologists required to interpret and report all the X-ray, CT and MRI imaging examinations conducted in the UK in the financial year 2018/19, taking into account the time taken to report each type of imaging examination and the estimated percentage of images reported by consultant clinical radiologists.

*[While consultant clinical radiologists report the vast majority of X-ray, CT and MRI imaging examinations, some are reported by specialist trainees, reporting radiographers and other clinicians.]*

**Table 10. Diagnostic imaging demand – UK, 2019**

	Volume of images, England <sup>[1]</sup>	Estimated volume of images, UK <sup>[2]</sup>	Percentage of images reported by consultants <sup>[3]</sup>	Hours to report <sup>[4]</sup>	Consultants required to report, WTE <sup>[5]</sup>
X-ray	23.5 million	27.9 million	60%	0.6 million	698
CT	5.7 million	6.7 million	90%	1.5 million	1,897
MRI	3.7 million	4.5 million	90%	1.3 million	1,671
Total	32.9 million	39.0 million	–	3.4 million	4,268

*[Due to rounding, numbers in this table may not add up precisely to the totals provided.]*

*[1] Diagnostic Imaging Dataset (DID) 2018/19.<sup>1</sup>*

*[2] UK estimate based on England imaging volumes, adjusted by population size to account for imaging activity in Northern Ireland, Scotland and Wales.<sup>20</sup>*

*[3] Estimated percentage of modality reported by consultant clinical radiologists.<sup>21</sup>*

*[4] Estimated time to report: two minutes per X-ray, 15 minutes per CT and 20 minutes per MRI.<sup>18</sup>*

*[5] Based on 20 consultant hours per week over 40 weeks.<sup>18</sup>*

Table 10 illustrates the significant effect of the complexity of imaging on consultant workload. MRIs and CTs account for an estimated 84% of the consultant imaging workload, despite X-ray volumes being much higher.

It is estimated that 4,268 consultant clinical radiologists are required to meet the demand for diagnostic imaging. As of September 2019, there were 3,732 WTE consultant clinical radiologists in post. Excluding the 666 WTE interventional radiologists (see Section 2.5), this translates to an estimated shortfall of 1,202 diagnostic consultant clinical radiologists (WTEs) in 2019.

## 5.2 Demand for interventional radiologists

The demand for IR has increased, as has the range and complexity of IR procedures. Trusts/health boards need a minimum of six (WTE) interventional radiologists to provide an effective and sustainable 24-hour IR service.<sup>11</sup>

Alternatively, trusts/health boards need effective formal arrangements in place to transfer patients to other trusts/health boards for IR procedures. Census data indicate that the minimum number of additional interventional radiologists needed in 2019 to meet these standards is 386.\* This equates to a 37% shortfall of interventional radiologists.

*[\*This is likely to be an underestimate as units covering populations of more than one million will probably require eight or more interventional radiologists to ensure a safe and sustainable rota.<sup>4]</sup>*

## 5.3 Total demand for consultant clinical radiologists

Combining the estimated shortfall of consultant diagnostic radiologists and interventional radiologists outlined in the preceding paragraphs, the total estimated shortage of WTE consultant clinical radiologists as of 2019 is 1,588. However, other data indicate that this is a conservative estimate:

- The number of additional consultant clinical radiologists required to meet the European average of 12.7 radiologists per 100,000 population is 2,174.
- The number of consultant clinical radiologists that could be funded by 2019 insourcing/outsourcing costs is 2,152.<sup>22</sup>

Taking into account all three shortfall indicators, the true shortfall of consultant clinical radiologists in 2019 is estimated to be 1,876 (see Appendix 1. Census methodology for details of calculations).

## 5.4 Managing demand

Only 1% of UK trusts/health boards (n=2) were able to meet their reporting requirements within consultant clinical radiologists' contracted hours in 2019. This compares with 12% in 2014, indicating that workforce shortfalls have increased.

### Methods used to manage shortfalls in reporting capacity

The census captures data on the various mechanisms used by trusts/health boards to manage shortages in reporting capacity in 2019. The results are shown in Figure 14. The vast majority of trusts/health boards (93%) pay their consultant clinical radiologists to undertake additional reporting outside their contracted hours. Most of these trusts/health boards (65%) also rely on radiologists' goodwill (unpaid reporting). Trusts/health boards should ensure that additional working hours for consultants are not excessive and likely to lead to fatigue, errors, stress and burnout.

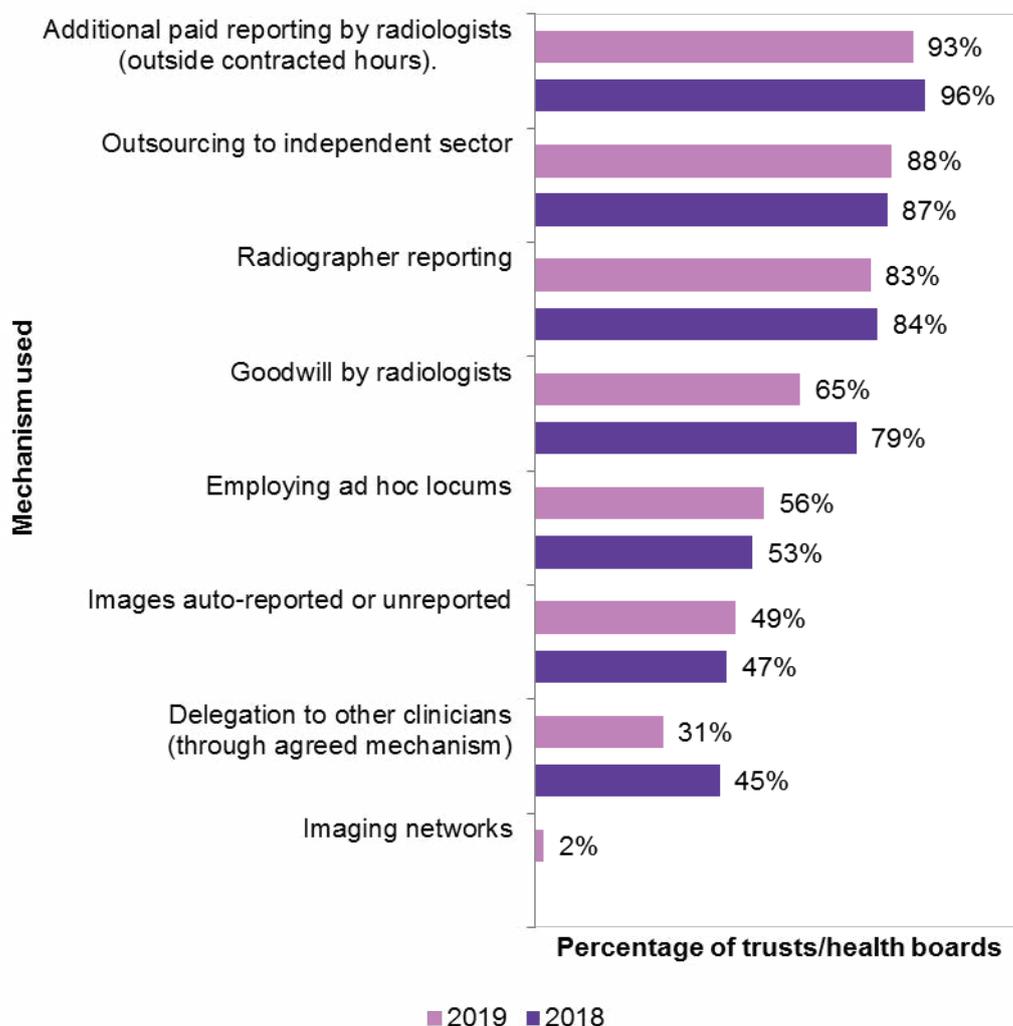
Other frequently used mechanisms were the outsourcing of reporting to an independent-sector company and radiographer reporting, used by 88% and 83% of trusts/health boards respectively.

It is concerning that almost half (49%) of trusts/health boards report leaving images auto-reported or unreported, due to the potential for diagnoses to be missed or delayed.

Over the past year, there has been a slight decrease in additional paid reporting by contracted consultant clinical radiologists (and reliance on consultant goodwill) and delegation to other clinicians. In contrast, there has been increased use of ad hoc locums, outsourcing and auto-reporting.

Census data indicate that imaging networks are not yet having any significant impact on capacity management, with only 2% of trusts/health boards reporting using networks to help manage shortfalls in reporting capacity. Networks have benefits, including the potential for increased access to specialist opinions, but do not in themselves increase the available workforce.

**Figure 14. Managing shortfall in reporting capacity – UK, one year comparison (2018 and 2019)**



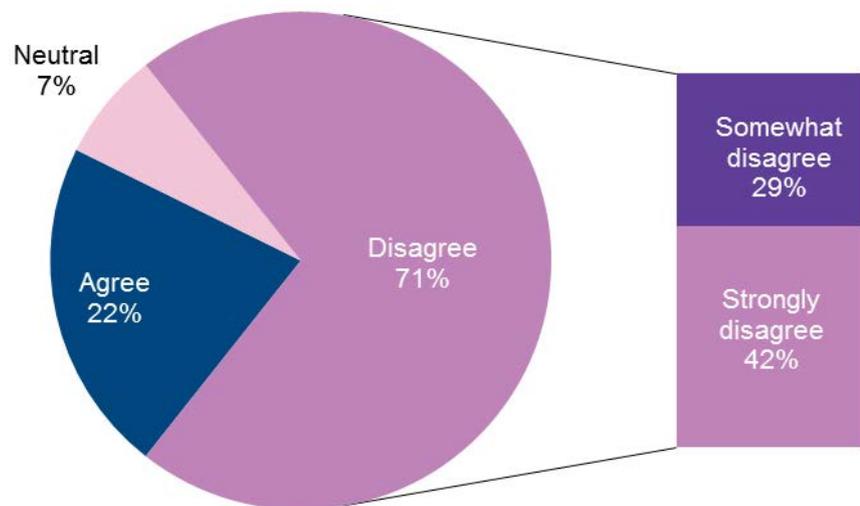
*[Imaging networks data was not collected in 2018.]*

### Clinical director views on workforce shortages

The census asked clinical directors of imaging services their views on the impact of radiology workforce shortages. Figure 15 presents the findings. Seven in ten clinical directors (71%) felt there were insufficient clinical radiologists in their department(s) to deliver a safe and effective level of patient care.

#### Figure 15. Clinical directors' views on radiology staffing levels – UK, 2019

*To what extent do you agree or disagree that there are currently sufficient consultant clinical radiologists employed in your radiology department(s) to be able to deliver safe and effective levels of patient care?*



Many clinical directors expressed significant concerns about the impact of radiology workforce shortages:

- **Missed targets and increasing waiting lists:** *'[We are] continually shifting focus to meet whichever waiting list is the longest.' 'We cannot complete target imaging and inpatient imaging within the new expected timeframes, let alone urgent and routine imaging.'*
- **Inadequate/unsafe service provision:** *'We are unable to provide a continuous and sustainable ... seven-day and out-of-hours service.' '[There is a] lack of robust IR service.' 'There are now no longer sufficient fully trained radiologists in the department to adequately provide both safe acute and cancer care.' '[My key concern is] unsafe patient care.'*
- **Delayed diagnoses:** *'[We have a] backlog of unreported images. [There is] sometimes a delay of eight weeks + for reports to be done.' 'Long turnaround times for reporting probably increase attendances at the emergency department.'*
- **Staff wellbeing concerns:** *'[We have a] fragile workforce under relentless pressure.' '[There are] gaps in rotas, [staff] sickness and burnout [and there is] no cover for leave.' '[We are] unable to deliver work in a timely fashion. Consultants here are overworked and stress levels can be high.' 'The constant pressure is impacting on the culture within the department.' 'The job is just not fun any more.'*
- **Status quo is unsustainable:** *'[My concern is the] collapse of the department.' 'A lot is dependent on [the] goodwill of existing staff, which is unfair and unsustainable.'*
- **Increased costs:** *'Our dependence on outsourcing threatens the service.'*
- **Lack of peer review:** *'Failure to audit non-radiologist reporting.' '[We are] unable to do peer review.'*
- **Inadequate SPA time:** *'MDTM cover and preparation time is not always adequate. Consultants [are] not getting their SPA as they are catching up on clinical work.'*
- **Reduced teaching commitments:** *'The department is having to withdraw from some training commitments to provide service, which further jeopardises our ability to recruit from the local training programme.' '[We] frequently decline requests from clinicians for support in MDTM and teaching.'*
- **Lack of specialist expertise:** *'[We have a] shortage of specialist skills in breast radiology and non-vascular IR especially out of hours.' 'We have been at the mercy of other hospitals to cover IR ... transferring patients to other centres is a day-to-day struggle.'*

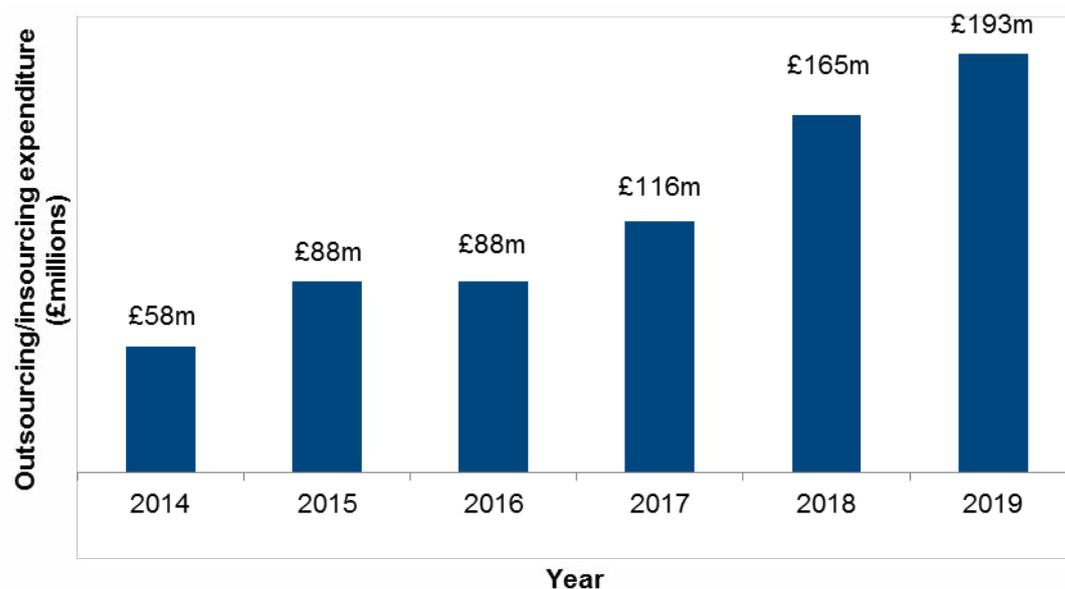
### Estimated costs of insourcing and outsourcing

Many of the mechanisms used to manage shortfalls in reporting capacity incur direct and indirect costs. The annual census asks trusts/health boards to report expenditure incurred through:

1. Outsourcing of reporting to the independent sector
2. Insourcing (paying staff for additional reporting outside of contracted hours)
3. Employing ad hoc locums.

Combined outsourcing, insourcing and ad hoc locum expenditure has increased significantly over the past five years. In 2019 expenditure totalled £193 million, more than triple the expenditure for these activities in 2014. This is shown in Figure 16.

**Figure 16. Estimated radiology combined outsourcing, insourcing and ad hoc locum expenditure – UK, five-year trend (2014–2019)**



The breakdown of the estimated £193 million expenditure reported in 2019 is as follows:

- **Outsourcing costs:** £108 million (56% of total expenditure) was spent on outsourcing, a stark 32% increase from the £81 million spent on outsourcing in 2018.\*

*[\*This figure includes reporting costs only. It excludes image acquisition costs. The census does not capture information on the extent to which increased outsourcing expenditure was driven by increased volumes of images outsourced versus the contribution of any price increases by the outsourcing companies.]*

- **Insourcing costs:** £56 million (29% total expenditure) was spent on insourcing. Several clinical directors explained that the punitive pension tax regulations led to many of their consultants reducing or stopping additional in-house reporting.

*[2019 insourcing costs are broadly consistent with 2018 equivalent expenditure. However, the census does not capture volumes of insourced scans (or associated costs), so any increases, or decreases, in these are not known.]*

- **Ad hoc locum costs:** £29 million (15% total expenditure) was spent on ad hoc locums appointed to cover excess reporting workload. This represents a 9% increase from 2018 equivalent costs.

For context, the UK expenditure of £193 million in 2019 is equivalent to the combined salaries of more than half of the existing workforce (2,152 WTE radiology consultants – based on point five of the 2018–19 NHS consultant pay scales for England).<sup>22</sup>

Table 11 shows the estimated reported insourcing/outsourcing expenditure across the four UK countries. Relative to population size, Northern Ireland had the highest expenditure in 2019 at £9.3 million, which equates to approximately £5 per head of population, compared with the average of £3 per head of population across the UK (see Appendix 2. Data table – Summary data by UK country, 2019).

**Table 11. Radiology combined outsourcing and insourcing expenditure – UK countries, 2019**

Expenditure	England	Northern Ireland	Scotland	Wales	UK total
Outsourcing	£92,916,000	£4,141,000	£6,712,000	£3,991,000	£107,761,000
Insourcing	£46,812,000	£2,517,000	£4,992,000	£1,983,000	£56,304,000
Ad hoc locums	£22,220,000	£2,627,000	£2,839,000	£1,622,000	£29,308,000
Total	£161,948,000	£9,286,000	£14,543,000	£7,596,000	£193,373,000

*[In 2019, six in ten trusts/health boards were able to provide exact expenditure figures for the above activities, two in ten were able to give estimates, and two in ten were unable to provide (or accurately estimate) expenditure. The mean UK reported expenditure was used to estimate expenditure for these trusts.]*

### Increasing efficiency in radiology services

In addition to the various methods covered above, radiology departments proactively seek to manage demand for imaging services. Four key complementary approaches are:

**Demand management:** Procedures should ensure radiology expertise is used effectively and efficiently. Techniques include vetting of imaging referrals to minimise inappropriate imaging and patient exposure to radiation and utilising the expert guidance of clinical radiologists to help referrers request the most appropriate imaging examination.

The use of *iRefer*, an RCR radiological investigation guidelines tool, facilitates referring general practitioners (GPs), radiographers, clinicians and other healthcare professionals in determining the most appropriate imaging investigation(s) or intervention for patients, based upon the best available evidence.<sup>23</sup>

**Optimising skill-mix:** This is essential in seeking to increase efficiency in radiology services but is restricted by workforce shortages across many roles. While the widespread use of radiographer reporting (see Figure 14) has increased reporting capacity, relevant

bodies\* should continue to work together to produce a standardised curriculum and defined standards of practice (and assessment) to ensure the requisite quality and consistency of reports to deliver safe and effective patient care (work is under way for musculoskeletal reporting). Also, workforce planning and management are required to establish the scope, boundaries and overlaps of the various imaging professionals, to ensure efficient and effective service delivery.

*[\*Includes The Royal College of Radiologists, Society and College of Radiographers, Health Education England and Higher Education Institutes.]*

**Use of artificial intelligence (AI) technologies:** These have the potential to increase efficiency in radiology clinical practice and streamline patient pathways. However, as outlined in the RCR's position statement on artificial intelligence, the introduction of AI will likely be an evolutionary process over many years.<sup>24</sup> Furthermore, robust but flexible regulatory and governance frameworks will be essential for the introduction of AI technologies into clinical radiology practice to ensure that patients receive optimum care.

**Radiology networks:** The NHS strategy for England includes all trusts moving to a networked model of service delivery.<sup>3</sup> Networks, with proper management, including centralised oversight, adequate resources and support, have the potential to increase resilience and the timely reporting of imaging examinations through the collaborative working of clinicians across a much wider geography. Networks also have the potential to increase access to specialist opinion for complex cases, providing adequate IT systems and infrastructure are in place for secure and efficient image sharing. However, networks do not in themselves provide any additional workforce capacity.

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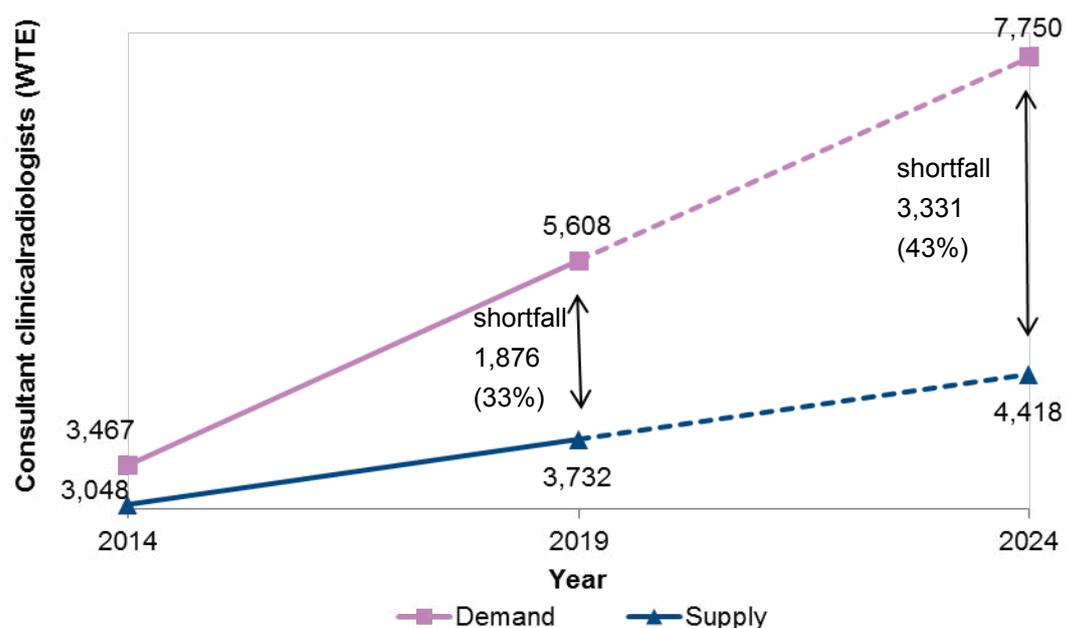
## 6. Gap between supply and demand – five-year forecast

Census data show that the gap between supply and demand has widened over the past five years from an estimated shortfall of 419 WTE consultant clinical radiologists (12% shortfall) in 2014 to 1,876 WTEs (33% of the required workforce) in 2019. Based upon current training numbers, recruitment trends and attrition rates, this gap is forecast to widen further to 3,331 WTEs (43%) by 2024. In order to close this gap through training alone, the number of doctors starting specialist training each year would need to more than treble every year for the next five years.

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Figure 17 is a simplified illustration of the widening gap between the estimated supply of consultant clinical radiologists and the estimated demand for radiology services.

**Figure 17. Estimated supply and demand WTE consultant radiologists – UK, ten-year period (2014–2024)**



[Due to rounding, numbers in this figure may not add up precisely.]

### Assumptions, next five years to 2024

- The 2019 shortfall (1,876 WTEs) is explained in Sections 5.1 and 5.2 (2019 estimated demand = consultant clinical radiologists in post + estimated shortfall).
- The 2024 estimated supply (4,418 WTEs) is explained in Section 4.5.
- The 2024 estimated demand assumes linear growth in demand.\*

[\*Over the past five years, the clinical radiology diagnostic workload (reporting of X-rays, CTs and MRIs) is estimated to have increased by 7% per annum, based on calculations outlined in Table 10. Due to the increasing demand for imaging, it is forecast that the diagnostic workload will see similar growth over the next five years (2019–2024).]

## 6.1 Recommendations

There is no simple solution to this workforce crisis, but a combination of measures will go some way to improving the situation:

- **UK specialist training numbers** (for both diagnostic and interventional radiologists) must expand as fast as possible. If this does not happen national ambitions for earlier diagnosis will not be achievable and patient care will ultimately suffer.
- High attrition rates, driven by workplace stress and unmanageable demands, should be reduced by taking appropriate measures to **retain radiology staff**.<sup>25</sup> This includes ensuring adequate infrastructure, implementing fair contractual terms and conditions,

supporting flexible working and finding long-term solutions to issues such as the tax charges on NHS pension schemes.

- Newer models of **virtual radiology academies** have the potential to ease the problem of lack of capacity (physical and human) within some trusts and health boards to support clinical radiology training. These should be embraced.
- **Overseas recruitment** of doctors should be supported centrally through effective immigration and registration rules and processes. The UK Government must enact legislative reform in order to further streamline processes for international doctors applying to join the specialist register, building on the GMC's ongoing work in this area.
- The UK's immigration system should allow doctors to **visit the UK** in order to meet the GMC's requirement for candidates to personally attend an interview to finalise registration applications.
- NHS England should ensure adequate resource, guidance and support in order for **imaging networks** in England to be fully developed and implemented.
- The Government, devolved administrations and arm's-length bodies should prioritise **long-term national workforce planning**, since medical training places need to be planned and funded more than ten years in advance of when the NHS requires consultant expertise.
- NHS employing organisations should ensure that the role of **trainers** is properly valued, including giving them adequate time in their job plans to reflect training responsibilities.
- The Doctors' and Dentists' Remuneration Board (DDRB) should implement contractual reform for SAS doctors. Trusts and health boards should take steps to adopt the SAS Charter, which sets optimal working conditions for **SAS doctors** to maximise their contribution to the NHS.<sup>26</sup>
- NHS employing organisations should ensure that our **breast and interventional neuroradiology (acute stroke) credentials** are appropriately funded and implemented.

## 6.2 What is the RCR doing?

Over the past year, the RCR has sought to highlight workforce shortages and propose solutions to the crisis through various projects and publications. Some highlights are as follows:

- In October 2019 we launched our **Credential in Breast Disease Management**. This credential was created by the RCR and the Association of Breast Clinicians, with support from Health Education England and the National Breast Imaging Academy. It is hoped that this qualification will help to provide additional support and capacity to the overstretched breast radiology workforce. Our **Interventional neuroradiology (acute stroke) credential for clinicians from non-IR and INR backgrounds** is also now under review with the GMC.
- Earlier this year we published our report *Harnessing the experience and clinical expertise of staff and associate specialist (SAS) doctors*, which outlines the vital contribution that **SAS doctors** make to the delivery of healthcare in the UK.<sup>6</sup> Embracing multidisciplinary working, including making better use of the skills of SAS doctors, will help to optimise the capabilities of the existing workforce.
- We have collaborated with other organisations to advocate for a solution to the issue of **tax charges on NHS pension schemes**. This has included working with the Academy

of Medical Royal Colleges to input into their letter to the Government outlining examples of direct impacts on service provision. In addition, we recently signed a joint letter compiled by the British Medical Association (BMA) and signed by various medical Royal Colleges and health bodies urging the Chancellor to provide a solution to this issue in the upcoming budget.

- At the time of writing, we are finalising a report on the issues that must be addressed if the **imaging networks** model is to be successful and sustainable. We have identified workforce as a core area that needs attention if networks are to yield their potential benefits.
- The RCR is producing a joint paper with the BSTI on the considerations necessary for **targeted lung health checks** to be effectively implemented. This includes recommendations on increasing the radiologist and radiographer workforce and ensuring adequate equipment, funding and IT infrastructure are in place. We also continue to lead and co-chair the diagnosis work stream of the **Taskforce for lung health**, where we are able to consistently draw attention to the issues of limited radiology workforce capacity.
- We are in discussions with the IR community and the GMC to try to find ways to improve **access to IR training**. We have also acted as an authoritative media commentator on the topic of shortages of interventional neuroradiologists in Scotland.
- We are working with HEE and others to provide a route for independently competent radiologists coming from overseas to work in the NHS on an 'Earn, Learn, Return' basis for a period of three years.
- We have responded to numerous **consultations** from across the healthcare sector and beyond, emphasising the need for an adequate imaging workforce wherever possible. Among these were our responses to the Health and Social Care Committee's call for evidence on implementing the NHS *Long Term Plan* and the consultation on Professor Sir Mike Richards' screening review, both of which stressed the need for increased workforce capacity.

Over the next year, we will continue to highlight the threats of the workforce crisis and advocate for improvements and solutions.

- We will continue to explore the best ways for the RCR to support our Fellows and members to adopt and embrace **artificial intelligence** and other new technologies, ensuring that both radiologists and patients benefit from these exciting developments.
- We will consider opportunities for **regional diagnostic collaboration**. We hope that presenting a unified voice for diagnostic services, in combination with other specialists, including pathologists and radiographers, will strengthen our case for recognition and investment in the diagnostic workforce.
- We will work with our cross-Faculty **Support and Wellbeing Working Group** to find practical solutions to avoid the harmful effects of stress and burnout within our specialties. Over the coming months, we will publish a statement of intent which will seek to identify specialty-specific drivers of stress and burnout and ways in which the current situation may be improved. We will also launch a webpage collating and publicising valuable resources to aid our Fellows and members in dealing with these issues.
- We are investigating ways to improve the provision of **paediatric interventional radiology** (PIR). This is likely to include formulating a paper on key issues facing PIR and possible solutions, and exploring options of upskilling clinicians to be able to carry out PIR procedures.

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## Appendix 1. Census methodology

Since 2008 (except for 2013), the RCR has gathered clinical radiology workforce data annually through an online census, which is completed by the clinical directors (or their delegates) of every radiology department in the UK.

### Survey method

Standardised questions (see Appendix 2) have been used year on year to allow for comparison of information and to identify trends over time. To facilitate data collection and data accuracy, 2018 staff data were provided to each radiology department, and clinical directors were asked to update the details for substantive and locum posts as of 1 September 2019. Data were collected through a secure web survey.

### Data accuracy

Due to the use of consistent questions, established processes and data quality checks, data accuracy is estimated to be high. Where discrepancies and outliers were identified in the data, clarification was sought from census respondents.

### Response rate

As with previous RCR censuses, the 2019 census achieved a 100% response rate, with all 171 acute trusts/health boards in the UK submitting information.

### Presentation of results

The workforce figures in this report are given as headcount unless otherwise stated. Where a member of staff works part-time across two regions, they will count as a headcount of one in each of the regions, and as one in the UK total, so the sum of the regional headcounts will be slightly higher than the UK headcount. Where WTE figures are used, the calculation conforms to the current NHS convention of excluding PAs that exceed ten.

### Calculations

#### Attrition

Attrition refers to those leaving the workforce. The attrition rate is calculated as:  
 $\text{WTE leavers} / \text{mean WTE consultant workforce}$ .

#### Whole-time equivalents (WTEs)

A WTE is a whole-time (or full-time) doctor with a contract of ten PAs per week; this is equivalent to a 40-hour week in England, Northern Ireland and Scotland and a 37.5-hour week in Wales.

The calculation of WTEs throughout this report conforms to the NHS convention of calculating one WTE as ten PAs (that is, it excludes PAs that exceed ten). WTEs include DCC and SPA, but exclude research and additional responsibility PAs.

#### Vacancy rate

The vacancy rate is the percentage of WTE staff in post against planned workforce levels.  
 $\text{Vacancy rate} = \text{WTE vacancies} / (\text{WTE vacancies} + \text{WTE staff in post})$ .

#### Estimated volume of images

UK volume calculated as  $(\text{volume of images in England} / 84\%) \times 100\%$ .  
This is based on population size. England's share of the UK population in 2019 is 84%.

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### IR shortfall

Calculated as 6 (minimum IR rota requirement) – number of WTE IRs on rota. Trusts with formal 24/7 networked transfer arrangements are excluded from this calculation.

### Estimated shortfall of consultant clinical radiologists

Calculated as  $(1,588 + ((2,174 + 2,152)/2))/2$ .

### Time periods

To consider trends over time, this report uses the March 2014 census as a comparator; that is, this report examines trends over the past five-and-a-half years.

For simplicity, the phrase 'in 2019' is used in this report to refer to the period covered by the 2019 census, which is September 2018 to August 2019 for non-financial data and April 2018 to March 2019 for financial data.

### Data processing

Census data are analysed together with the GMC medical register and clinical radiology specialty training data held by the RCR. The RCR processes data in accordance with UK data protection legislation.

### Data collection period

Data collection opened on 5 September 2019 and closed on 14 January 2020.

### Data limitations

The census does not capture work undertaken outside of contracted hours, or sickness and absence rates.

### Queries

Please send queries regarding the census to [census@rcr.ac.uk](mailto:census@rcr.ac.uk)

## Appendix 2. Summary data by UK country, 2019

### Data table

Consultant clinical radiologists (2019 unless stated otherwise)	England	Northern Ireland	Scotland	Wales	UK total
<b>Number of trusts/health boards</b> (included in census)	147	5	12	7	171
<b>Clinical directors' views</b> The proportion who think there are insufficient radiologists to deliver safe and effective patient care	72%	60%	67%	71%	71%
<b>Workforce</b>					
Consultant clinical radiologists (headcount)	3,415	144	347	171	4,076
<i>Of which, locums</i>	200	15	22	14	250
<i>Locums as % of workforce</i>	6%	10%	6%	8%	6%
Whole-time equivalents (WTEs)	3,120	137	319	156	3,732
<i>Of which, interventional radiologists</i>	582	18	40	26	666
<i>IRs as % of WTE workforce</i>	19%	13%	13%	17%	18%
Trainees	1,355	51	158	72	1,636
<i>Trainees as % of workforce</i>	28%	26%	31%	30%	29%
SAS-grade doctors	77	0	4	3	83
<b>Total headcount</b> (consultants, trainees and SAS)	4,846	195	509	246	5,795
<b>Workforce trends</b>					
Percentage of WTE workforce forecast to retire within five years	19%	19%	20%	25%	20%
Percentage of IR WTE workforce forecast to retire within five years	20%	17%	21%	15%	20%
Annual workforce growth (average, past five years)	4%	3%	2%	2%	4%
Vacancy rate	11%	16%	10%	12%	11%
% workforce loss due to LTFT working	9%	5%	8%	9%	8%

Consultant clinical radiologists (2019 unless stated otherwise)	England	Northern Ireland	Scotland	Wales	UK total
<b>Programmed activities (PAs)</b>					
Mean PAs per week (full-time NHS consultants)	10.7	11.0	10.9	11.0	10.8
<i>Of which, DCCs</i>	8.7	9.2	8.7	8.5	8.7
<i>Of which, SPAs</i>	2.0	1.8	2.2	2.5	2.0
<b>Population</b>					
Population (2018)	55,977,000	1,882,000	5,438,000	3,139,000	66,436,000
WTE radiologists per 100,000 population (excludes trainees)	5.6	7.3	5.9	5.0	5.6
WTE radiologists per 100,000 population (includes trainees) European average is 12.7	8.0	10.0	8.8	7.3	8.1
WTE IRs per million population (excludes trainees)	10	10	7	8	10
<b>Outsourcing, insourcing and locum expenditure (FY 18/19)</b>					
Outsourcing to teleradiology companies	£92,916,404	£4,141,295	£6,712,439	£3,991,066	£107,761,204
Additional payments to contracted radiologists (insourcing)	£46,811,878	£2,517,053	£4,991,571	£1,983,187	£56,303,690
Ad hoc locums (for excess reporting)	£22,220,152	£2,627,412	£2,838,559	£1,621,829	£29,307,952
<b>Total insourcing/outsourcing costs</b>	£161,948,435	£9,285,760	£14,542,569	£7,596,082	£193,372,845
Outsourcing costs per head of population	£2.89	£4.93	£2.67	£2.42	£2.91

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### Appendix 3. Census questions 2019

\*Indicates a mandatory field

#### Stage 1: Workforce Census Privacy Notice

I have read and accept The Royal College of Radiologists' Workforce Census Privacy Notice.\*

#### Stage 2: Organisational details

2.1 Radiology department(s)\*

2.2 Trust/health board\*

2.3 Census contact – Full name\*

2.4 Census contact – Email\*

2.5 Census contact – Telephone number\*

2.6 Are the clinical director details the same as the census contact details?\*

- Yes – Please continue to the next page
- No – Please enter the clinical director details below.
  - Clinical director – Full name\*
  - Clinical director – Email\*
  - Clinical director – Telephone number\*

#### Stage 3: Staff details – radiology

3.1 Forename\*

3.2 Surname\*

3.3 Grade\* (drop-down list)

- Consultant-grade radiologist (NHS contract)
- Consultant-grade radiologist (mixed NHS/academic – NHS contract)
- Consultant-grade radiologist (academic – university contract)
- SAS-grade radiologist
- Research fellow

3.4 GMC number (consultants only)

3.5 Direct clinical care (DCC) PAs\*

3.6 Training-only PAs

3.7 Supporting professional activities (SPAs)\*

3.8 Total PAs (DCC, SPA and training) (auto-filled)

3.9 Employment type (auto-filled – full-time = 10 PAs+)

- Full-time
- Part-time

3.10 Type of radiologist\* (consultants only – drop-down list)

- General
  - General with one main area of interest
-

- General with two main areas of interest
  - Specialist with one main area of interest
  - Specialist with two main areas of interest
- 3.11 Area/s of interest (omitted for 'general' radiologists)
- Primary area of interest – breast, cardiac, chest/lung, endocrine... (drop-down list)
  - Secondary area of interest (same drop-down list)
- 3.12 Employed as a locum  if ticked...
- Period employed as locum up to 1 September 2019\* (drop-down list)
    - 1–3 months
    - 4–6 months
    - 7–9 months
    - 10–12 month
    - >12 months
  - Reason for locum position (drop-down list)
    - Ad hoc reporting for excess workload
    - Cover for long-term (>1 month) sickness
    - Currently employed to fill vacant/unfilled post
    - Maternity/paternity cover
    - Other
- 3.13 Left since 1 September 2018  if ticked...
- Reason for leaving (drop-down list)
    - Retired
    - Left for reasons other than retirement
    - Not known/Don't wish to say

### Stage 4a: Vacancies

- 4.1 Unfilled post status\* (drop-down list)
- Funded but not yet advertised
  - Funded but not thought worth advertising
  - Advertised but not yet interviewed
  - Appointed but not yet taken up
  - Advertised but failed to appoint AND planning to re-advertise in next 3 months
  - Advertised but failed to appoint AND not contemplating re-advertising in next 3 months
- 4.2 Grade\* (drop-down list)
- Consultant-grade radiologist (NHS contract)
  - Consultant-grade radiologist (mixed NHS/academic – NHS contract)
  - Consultant-grade radiologist (academic – university contract)
  - SAS-grade radiologist
  - Research fellow

4.3 Total PAs\* (SPA, DCC and training)

4.4 Employment type (auto-filled)

- Full-time (10 PAs+)
- Part-time

4.5 Type of radiologist\* (drop-down list)

- General
- General with one main area of interest
- General with two main areas of interest
- Specialist with one main area of interest
- Specialist with two main areas of interest

4.6 Area/s of interest (omitted for 'general' radiologists)

- Primary area of interest (drop-down list)
- Secondary area of interest (drop-down list)

4.7 Unfilled period (to the nearest month)\* (drop-down list):

- 0 months
- 1 month (list proceeds in 1-month increments...)
- 12+ months
- Don't know

4.8 No vacancies

(vacancy details must be entered or this box ticked to confirm no vacancies)

### Stage 4b: Recruitment

4.9 Has your department(s) tried to recruit clinical radiology candidates from outside the UK in the past year?\*

- Yes
- No
- Don't know

4.10 If yes, was this successful?\* (drop-down list)

- Yes
- Yes but not in all instances
- No
- Don't know

4.11 Additional comments relating to recruitment: (free text)

### Stage 5a: Workforce capacity

5.1 How has your department managed any shortfalls in reporting capacity in the past year? Please tick all that apply.

- Additional paid reporting by the department's own radiologists outside their contracted hours
- Outsourcing of reporting to an independent-sector company

- Reporting by radiographers
- Goodwill by radiologists (unpaid overtime)
- Images left unreported or auto-reported
- Delegation of reporting to clinicians through an agreed mechanism
- Employing ad hoc locums
- Imaging networks
- N/A – All reporting requirements were met by radiology staff within contracted hours
- Other (please specify)

5.2 What was the total department spending on the following radiology costs in the 12 months ending 31 March 2019?\*

- Outsourcing to teleradiology companies (daytime and overnight): £
  - Actual  Estimated  Not known  \*
- Additional payments to contracted radiologists (insourcing): £
  - Actual  Estimated  Not known  \*
- Ad hoc locums appointed to cover excess reporting workload (include salaries, on-costs and agency fees): £
  - Actual  Estimated  Not known  \*

5.3 Additional comments relating to outsourcing/insourcing expenditure: (free text)

5.4 Approximately how many of the consultant clinical radiologists included in your census submission regularly provide a general out-of-hours service?\* (headcount)

5.5 How many sessions (direct or SPA) are lost due to compensatory arrangements following out-of-hours working in a typical week?\*

5.6 How many hours does a consultant radiologist typically spend preparing and attending MDTMs in an average week?\*

5.7 How many radiologist sessions were lost due to illness in the 12 months ending 1 September 2019?\*

### Stage 5b: ARSAC licence holders

5.8 How many Administration of Radioactive Substances Advisory Committee (ARSAC) licence holders worked for your radiology department(s) as of 1 September 2019?\*

- Number of radiologists: 0/1/2/3/4/5/6/7/8/9/10 or more/unknown (drop-down list)
- Number of Nuclear Medicine Physicians: (same drop-down list)

### Stage 6: Interventional Radiology (IR)

6.1 Does your trust have a 24/7 IR rota? \* (Yes/No)

6.2 If yes, how many interventional radiologists are on the 24/7 rota? (drop-down list)

- 3 or fewer
- 4 (list proceeds in increments of one...)
- 10 or more

6.3 If no, does your trust have a formal networked arrangement to transfer patients for IR procedures? (drop-down list)

- No
- Yes – covers daytime AND out of hours
- Yes – covers daytime only
- Yes – covers out of hours only
- Don't know

6.4 What proportion of diagnostic radiologists in your trust perform image-guided biopsies?\* (drop-down list)

- All/almost all (90%+)
- Most (51–89%)
- Some (11–50%)
- Very few/none (0–10%)

6.5 What proportion of diagnostic radiologists in your trust perform image-guided drainages?\* (drop-down list)

- All/almost all (90%+)
- Most (51–89%)
- Some (11–50%)
- Very few/none (0–10%)

6.6 Further information regarding your responses above and IR services at your trust: (free text)

### Stage 7: Workforce shortages

7.1 To what extent do you agree or disagree that there are currently sufficient consultant clinical radiologists employed in your radiology department(s) to be able to deliver safe and effective levels of patient care? (drop-down list)

- Strongly agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree
- Don't know / Prefer not to say

7.2 What are your key concerns regarding the impact of radiology workforce shortages? (free text)

### Stage 8: Final comments

8.1 Please tell us:

- Any further details relevant to your census submission; and/or
- Feedback specific to the RCR census itself to further improve the data or survey process in future years.

8.2 Have you or your colleagues used past results of RCR censuses? If so, how were they used and what impact did this have? (free text)

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## Appendix 4. Census completions 2019

Thank you to the following trusts and health boards for completing the 2019 census:

### England – East Midlands

Chesterfield Royal Hospital NHS Foundation Trust  
Kettering General Hospital NHS Foundation Trust  
Northampton General Hospital NHS Trust  
Nottingham University Hospitals NHS Trust  
Sherwood Forest Hospitals NHS Foundation Trust United  
United Lincolnshire Hospitals NHS Trust  
University Hospitals of Derby and Burton NHS Foundation Trust  
University Hospitals of Leicester NHS Trust

### England – East of England

Basildon and Thurrock University Hospitals NHS Foundation Trust  
Bedford Hospital NHS Trust  
Cambridge University Hospitals NHS Foundation Trust  
East and North Hertfordshire NHS Trust  
East Suffolk and North Essex NHS Foundation Trust  
James Paget University Hospitals NHS Foundation Trust  
Luton and Dunstable University Hospital NHS Foundation Trust  
Mid-Essex Hospital Services NHS Trust  
Norfolk and Norwich University Hospitals NHS Foundation Trust  
North West Anglia NHS Foundation Trust  
Royal Papworth Hospital NHS Foundation Trust  
Southend University Hospital NHS Foundation Trust  
The Princess Alexandra Hospital NHS Trust  
The Queen Elizabeth Hospital King's Lynn NHS Foundation Trust  
West Hertfordshire Hospitals NHS Trust  
West Suffolk NHS Foundation Trust

### England – London

Barking, Havering and Redbridge University Hospitals NHS Trust  
Barts Health NHS Trust  
Chelsea and Westminster Hospital NHS Foundation Trust  
Croydon Health Services NHS Trust  
Epsom and St Helier University Hospitals NHS Trust  
Great Ormond Street Hospital for Children NHS Foundation Trust  
Guy's and St Thomas' NHS Foundation Trust  
Homerton University Hospital NHS Foundation Trust  
Imperial College Healthcare NHS Trust  
King's College Hospital NHS Foundation Trust  
Kingston Hospital NHS Foundation Trust  
Lewisham and Greenwich NHS Trust  
London North West University Healthcare NHS Trust  
Moorfields Eye Hospital NHS Foundation Trust  
North Middlesex University Hospital NHS Trust  
Royal Brompton and Harefield NHS Foundation Trust  
Royal Free London NHS Foundation Trust

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Royal National Orthopaedic Hospital NHS Trust  
St George's University Hospitals NHS Foundation Trust  
The Hillingdon Hospitals NHS Foundation Trust (incomplete submission)  
The Royal Marsden NHS Foundation Trust  
University College London Hospitals NHS Foundation Trust  
Whittington Health NHS Trust

### **England – North East**

City Hospitals Sunderland NHS Foundation Trust  
County Durham and Darlington NHS Foundation Trust  
Gateshead Health NHS Foundation Trust  
Newcastle upon Tyne Hospitals NHS Foundation Trust  
North Tees and Hartlepool NHS Foundation Trust  
Northumbria Healthcare NHS Foundation Trust  
South Tees Hospital NHS Trust  
South Tyneside NHS Foundation Trust

### **England – North West**

Aintree University Hospital NHS Foundation Trust  
Alder Hey Children's NHS Foundation Trust  
Blackpool Teaching Hospitals NHS Foundation Trust  
Bolton NHS Foundation Trust  
Countess of Chester Hospital NHS Foundation Trust  
East Cheshire NHS Trust  
East Lancashire Hospitals NHS Trust  
Lancashire Teaching Hospitals NHS Foundation Trust  
Liverpool Heart and Chest NHS Foundation Trust  
Manchester University NHS Foundation Trust  
Mid-Cheshire Hospitals NHS Foundation Trust  
North Cumbria University Hospitals NHS Foundation Trust  
Pennine Acute Hospitals NHS Trust  
Royal Liverpool and Broadgreen University Hospitals NHS Trust  
Salford Royal NHS Foundation Trust  
Southport and Ormskirk Hospital NHS Trust  
St Helens and Knowsley Teaching Hospitals NHS Trust  
Stockport NHS Foundation Trust  
Tameside and Glossop Integrated Care NHS Foundation Trust  
The Christie NHS Foundation Trust  
The Clatterbridge Cancer Centre NHS Foundation Trust  
The Walton Centre NHS Foundation Trust  
University Hospitals of Morecambe Bay NHS Foundation Trust  
Warrington and Halton Hospitals NHS Foundation Trust  
Wirral University Teaching Hospital NHS Foundation Trust  
Wrightington, Wigan and Leigh NHS Foundation Trust

### **England – South Central**

Buckinghamshire Healthcare NHS Trust  
Hampshire Hospitals NHS Foundation Trust  
Isle of Wight NHS Trust  
Milton Keynes University Hospital NHS Foundation Trust

Oxford University Hospitals NHS Foundation Trust  
Portsmouth Hospitals NHS Trust  
Royal Berkshire NHS Foundation Trust  
University Hospital Southampton NHS Foundation Trust

### England – South East

Ashford and St Peter's Hospitals NHS Foundation Trust  
Brighton and Sussex University Hospitals NHS Trust  
Dartford and Gravesham NHS Trust  
East Kent Foundation Hospitals University NHS Foundation Trust  
East Sussex Healthcare NHS Trust  
Frimley Health NHS Foundation Trust  
Maidstone and Tunbridge Wells NHS Trust  
Medway NHS Foundation Trust  
Queen Victoria Hospitals NHS Foundation Trust  
Royal Surrey County Hospital NHS Foundation Trust  
Surrey and Sussex Healthcare NHS Trust  
Western Sussex Hospitals NHS Foundation Trust

### England – South West

Dorset County Hospital NHS Foundation Trust  
Gloucestershire Hospitals NHS Foundation Trust  
Great Western Hospitals NHS Foundation Trust  
North Bristol NHS Trust  
Northern Devon Healthcare NHS Trust  
Poole Hospital NHS Foundation Trust  
Royal Cornwall Hospitals Trust  
Royal Devon and Exeter NHS Foundation Trust  
Royal United Hospitals Bath NHS Trust  
Salisbury NHS Foundation Trust  
Taunton and Somerset NHS Foundation Trust  
The Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust  
Torbay and South Devon Healthcare NHS Foundation Trust  
University Hospitals Bristol NHS Foundation Trust  
University Hospitals Plymouth NHS Trust  
Weston Area Health NHS Trust  
Yeovil District Hospital NHS Foundation Trust

### England – West Midlands

Birmingham Women's and Children's NHS Foundation Trust  
George Eliot Hospital NHS Trust  
Sandwell and West Birmingham Hospitals NHS Trust  
Shrewsbury and Telford Hospital NHS Trust  
South Warwickshire NHS Foundation Trust  
The Dudley Group NHS Foundation Trust  
The Robert Jones and Agnes Hunt Orthopaedic Hospital NHS Foundation Trust  
The Royal Orthopaedic Hospital NHS Foundation Trust  
The Royal Wolverhampton NHS Trust  
University Hospitals Birmingham NHS Foundation Trust  
University Hospitals Coventry and Warwickshire NHS Trust

University Hospitals of North Midlands NHS Trust  
Walsall Healthcare NHS Trust  
Worcestershire Acute Hospitals NHS Trust  
Wye Valley NHS Trust

### **England – Yorkshire and the Humber**

Airedale NHS Foundation Trust  
Barnsley Hospital NHS Foundation Trust  
Bradford Teaching Hospitals NHS Foundation Trust  
Calderdale and Huddersfield NHS Foundation Trust  
Doncaster and Bassetlaw Teaching Hospitals NHS Foundation Trust  
Harrogate and District NHS Foundation Trust  
Hull and East Yorkshire Hospitals NHS Trust  
Leeds Teaching Hospitals NHS Trust  
Northern Lincolnshire and Goole Hospitals NHS Foundation Trust  
Sheffield Children's NHS Foundation Trust  
Sheffield Teaching Hospitals NHS Foundation Trust  
The Mid-Yorkshire Hospitals NHS Trust  
The Rotherham NHS Foundation Trust  
York Teaching Hospital NHS Foundation Trust

### **Northern Ireland**

Belfast Health and Social Care Trust  
Northern Health and Social Care Trust  
South Eastern Health and Social Care Trust  
Southern Health and Social Care Trust  
Western Health and Social Care Trust

### **Scotland**

NHS Ayrshire and Arran  
NHS Borders  
NHS Dumfries and Galloway  
NHS Fife  
NHS Forth Valley  
NHS Grampian  
NHS Greater Glasgow and Clyde  
NHS Highland  
NHS Lanarkshire  
NHS Lothian  
NHS Tayside  
NHS Western Isles

### **Wales**

Aneurin Bevan University Health Board  
Betsi Cadwaladr University Health Board  
Cardiff and Vale University Health Board  
Cwm Taf Health Board  
Hywel Dda Health Board  
Swansea Bay University Health Board  
Velindre University NHS Trust

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