British Heart Foundation

Who What Where

Characteristics of the UK cardiovascular workforce

June 2022

What we know

Painting a picture

Heart and circulatory diseases affect everyone and anyone. Tackling these diseases will benefit all of us: our families, communities and health services.

We need well-trained and resourced healthcare teams to make this a reality. We wanted to know what types of workers are supporting people with heart and circulatory (cardiovascular) diseases in the UK.

In **May 2022** we drew together the most up to date information about the workforce from official statistics, professional societies and published and unpublished research. We focused on healthcare workers whose main role is supporting people with cardiovascular disease.

We also asked 62 people from professional societies, workforce planning teams, NHS services and the voluntary sector what affects whether the UK has the workforce we need.

Who provides cardiovascular care?

Over 7 million of us in the UK live with cardiovascular disease. Many types of healthcare workers support us, but we don't have a clear idea of exactly how many people make up the core cardiovascular workforce. Data from the NHS and professional societies suggests that across all four countries of the UK, as of late 2021:

- there were over 30,000 full-time equivalent staff working in cardiovascular care in hospital and community trusts across the UK. This includes doctors and nurses, allied health professionals, trainees, support staff and managers. About two thirds were in patient-facing clinical roles

- there were around 1,300 staff providing ultrasound scans of the heart (echocardiograms); 1,700 consultant cardiologists and 850 cardiologists in training; 250 consultant cardiac surgeons; 450 senior vascular surgeons; 300 cardiothoracic surgical care practitioners; and 10,000 hospital and community nurses working in cardiovascular care (all headcounts). We don't know much about the people providing cardiovascular care in primary care, community services, the voluntary sector or social care

- the workforce is not spread evenly across the UK. The largest number of workers are in large urban areas in England. These areas do not necessarily have the most people with, or poorest outcomes from, cardiovascular disease

The cardiovascular workforce has mostly similar characteristics to the wider NHS workforce. For example, like the wider NHS workforce, many providing cardiovascular care are over the age of 55 (about 25%). But there are some differences. There are fewer women working as cardiovascular consultants (about 15%) compared to many other consultant roles. A higher proportion of cardiovascular consultants and nurses were trained outside the UK.

What influences capacity?

According to the people we interviewed and published literature there are not enough workers to provide all the cardiovascular care we need now and in future.

Things affecting whether the cardiovascular workforce has the capacity and capability to meet people's needs include:

- **not enough people in existing roles**, with high demand for services and up to one in ten positions vacant
- **not enough people being trained** to meet future needs. It takes years to recruit and train new workers
- **people leaving their roles**. More people than ever report leaving roles to reduce stress or improve their work/life balance. There were also changes in internationally qualified workers seeking posts or remaining in the UK after the UK left the European Union
- **losing senior workforce.** About one quarter of workers are nearing retirement age. Some older workers are discouraged from working more due to pension taxes
- **challenging work environment.** A significant proportion of the wider NHS workforce report bullying, harassment and poor health and wellbeing. Female cardiologists and trainees report more harassment than males

Most of these issues are affecting the rest of the NHS workforce too. Solutions tested include new roles and skill mix, wellbeing initiatives and flexible working, but there are no easy solutions.

What next?

Much remains unknown. To help fill gaps, in 2023 we are doing a census of key cardiovascular roles in acute hospitals in England. NHS Scotland is doing a similar census. NHS England and NHS Improvement is modelling how many consultant cardiologists and cardiac physiologists are needed. England's Cardiac Pathway Improvement Programme is providing guidance about training opportunities. These steps will all help, but will not give a complete picture.

The stakeholders we spoke with identified these priorities for developing the cardiovascular workforce, in addition to what is already planned:

- We need a **wider definition of the cardiovascular workforce**. Cardiovascular disease affects us all. Cardiovascular care should be everyone's business. Many staff support people with cardiovascular conditions, even though this may not be their sole focus. Examples include general practice teams, dieticians and community pharmacists. Stakeholders said that workforce planning should consider wider workforce trends in recruitment, retention and wellbeing rather than focusing only on those who mainly provide specialist cardiovascular care.
- **Making sure all roles are trained to support cardiovascular care** will encourage prevention and holistic care.
- The **mix of skills** available in teams and the way we organise work is important, not just the number of specific types of workers.
- Good assessment and diagnosis is key and can be a bottleneck for accessing other support. Stakeholders said that it was a priority to explore solutions to shortages of scanning staff. They said there are not enough **echocardiographers** to cope with demand. Training more workers takes time. Support roles could free up time for qualified staff to undertake scans. Training could also help the wider workforce know when it is most helpful to refer people for scans, or not.
- **Primary care teams** could be trained and supported to further help prevent disease, identify people at risk, triage to refer appropriately and follow up.
- **Administrative and support staff** are key members of the workforce and need to be trained, valued and retained. Often recruitment and retention focuses on clinical staff.
- **Social care and voluntary sector teams and unpaid carers** have a key role to play. Little is known about their capacity and needs. We need more joined up thinking when planning and supporting the wider workforce.

What we cover

What we did 5
- Why we wanted answers 5
- How we found out 6

Who. What. Where 9
- The NHS workforce overall 9
- Cardiovascular workforce in hospital 17
- Cardiovascular workforce in the community 37

Why 39
- Getting staff 39
- Keeping staff 43
- Working environment and roles 46

What next 48
- Planning holistically 49
- Opportunities to innovate 51

What we found 57
- Data issues 61

Learn more 64

Acknowledgements

British Heart Foundation funds world-leading research into the causes, prevention, treatment and cure of heart and circulatory diseases. We are the biggest independent funder of heart and circulatory disease research in the UK. Find out more at bhf.org.uk.

We created this report for our **internal use**. Following requests from interested stakeholders, we made the report publicly available on our website. We would like to thank the people and organisations that contributed information. Our Health Intelligence team and an independent organisation called The Evidence Centre drew together themes.

British Heart Foundation

What we did

This section describes what we wanted to know and how we found out

Why we wanted answers

Over 7 million of us in the UK have cardiovascular disease. This is a general term for conditions affecting the heart or blood vessels (circulatory system). It includes diseases that we are born with and those that develop later, like coronary heart disease, heart failure, stroke and vascular dementia. One in four of us die from heart and circulatory diseases.[1] People in deprived areas in the UK are also more likely to die prematurely from heart and circulatory diseases than people in less deprived areas.[2]

Tackling cardiovascular disease would save more lives over the next 10 years than focusing on any other condition.[3] That's why it's a priority to prevent, diagnose and treat cardiovascular disease in the UK.[4] **We need a strong health and social care workforce to do this.**

The workforce is the single biggest factor impacting patient care. As the nation's heart charity, we have an obligation to develop policy and speak out on the issues that matter most. We wanted to find out how many and what types of workers are caring for people with cardiovascular disease in the UK. We drew together readily available information to support our **internal planning**. We will use this information to reflect on whether there are enough workers to support people now and in future, and what action is needed.

What we wanted to know

We wanted to find out:

- the **characteristics of the cardiovascular workforce**, including numbers, roles, geographic spread and demographics
- factors that may affect cardiovascular **workforce planning and development in the UK**, including staff wellbeing, retention rates and vacancy rates

In 2023 we are doing a census of key cardiovascular roles in acute hospital settings in England. The Scottish Government is undertaking a similar census. These two audits will provide the first ever detailed datasets about some key roles in the cardiovascular workforce to help explore the challenges ahead. But this work will focus on a small number of roles in hospital. We wanted to see whether any other data were available to add to what our census will tell us, so we scanned published and unpublished literature.

We did not analyse how many or what type of workers are needed to provide care now or in future.

How we found out

Who we were interested in

We spent eight weeks drawing together information. Table 1 shows the types of workers we were interested in.

We defined the 'core cardiovascular workforce' as healthcare workers whose main job is helping people diagnosed with cardiovascular disease. We focused mainly on people working in acute hospital settings. We were also interested in healthcare staff working in community settings helping people recover.

We did not focus on prevention or on social care or the voluntary sector. We know these are important gaps.

Table 1: How we defined the core cardiovascular workforce

Primary care	Acute hospital care	Community care
• GPs with extended roles in heart conditions (previously called GPs with special interests)	• Cardiologists (consultants, higher speciality trainees, academics, staff grade) • Cardiac physiologists • Specialist nurses (heart failure, arrhythmia, chest pain, and inherited cardiac conditions) • Cardiology ward nurses • Advanced clinical practitioners in cardiology • Cardiac surgeons • Cardiac anaesthetists • Cardiac perfusionists • Specialist pharmacists • Physician associates working in cardiology • Radiographers who specialise in cardiology • Cardiac clinical scientists • Radiologists	• Cardiac rehabilitation specialists (nurses, physiotherapists and exercise specialists) • Clinical psychologists specialising in heart conditions • Dieticians specialising in heart conditions

How we found statistical data

Our Health Intelligence team analysed workforce data available via **NHS databases.** They examined 18 data sources, including 10 datasets from NHS Digital relating to the primary and secondary care workforce in England; two datasets from NHS Scotland/Public Health Scotland relating to the primary and secondary care workforce in Scotland; two datasets from the Welsh Government/Stats Wales relating to the primary and secondary care workforce in Wales and four datasets from the Northern Ireland Department of Health/Health and Social Care Board. They also explored three data sources from the Royal College of Physicians, examining consultants and higher speciality trainees.

How we found research

We were interested in published and unpublished research about workforce characteristics or factors affecting retention and workforce numbers. We rapidly scanned for publicly available information. We did not conduct a systematic review.

We searched seven bibliographic databases. We also did a general internet search, including the websites of professional societies, charities and NHS organisations.

We focused on the most up to date information. We included material released between 2010 and May 2022. We did not include editorials, opinion pieces or publications that did not contain empirical data.

We identified **106 studies**. Most summarised similar data as that in our analysis of workforce databases or focused on workforce development priorities and contextual factors rather than the number, type and skills of people in the workforce.

How we found other information

We found limited published research about the characteristics of the workforce so we contacted professional societies and other stakeholders to:

- ask for any unpublished surveys or data they had
- ask their opinions about the most important workforce needs and things that help or get in the way of keeping staff in their roles

62 people shared their views in informal interviews or small group discussions. They were from voluntary and statutory services, arms' length bodies and professional societies (see Box 1). People shared their personal reflections, not official responses on behalf of organisations.

Box 1: Organisations where stakeholders shared reflections or signposted us to information*

- Age UK
- Arrhythmia Alliance patient group
- Association for Inherited Cardiac Conditions
- Blood Pressure UK
- British and Irish Hypertension Society
- British Association for Cardiovascular Prevention and Rehabilitation
- British Association for Nursing in Cardiovascular Care
- British Cardiovascular Intervention Society
- British Cardiovascular Society
- British Congenital Cardiac Association
- British Heart Rhythm Society
- British Medical Association
- British Society for Heart Failure
- British Society of Cardiovascular Imaging / of Cardiac Computed Tomography
- British Society of Cardiovascular Magnetic Resonance
- British Society of Echocardiography
- Cochrane Heart Group
- Health Education England (2 regional teams)
- Health and Social Care (Northern Ireland)
- Heart Research Institute UK
- Heart UK
- National Voices
- Nepalese Heart Foundation UK
- Northern Ireland Chest Heart and Stroke
- NHS Employers
- NHS England and NHS Improvement (national and 4 regions)
- NHS Health Scotland
- NHS Scotland
- NHS services including workforce planners, managers and HR teams in general practices, community trusts (rehabilitation), acute trusts (imaging, outpatient and ward teams) and centralised / regional teams. People took part from each of the four countries of the UK
- NHS Workforce Alliance
- Public health / local authority teams (3 in England)
- Primary Care Cardiovascular Society
- Royal College of Physicians
- Royal College of Surgeons
- Royal Society of Medicine
- Society for Cardiological Science and Technology
- Society for Cardiothoracic Surgery
- South Asian Health Action
- The Kings Fund
- The Health Foundation
- The Nuffield Trust
- Vascular Society

* We approached people in 7 other organisations that were not available to take part within the timeline.

Who. What. Where

This section summarises what we know about the number and type of health professionals providing cardiovascular care in the UK

The NHS workforce overall

The NHS is the UK's largest employer. It is also one of the biggest employers in the world. About 1.3 million people work in the NHS. Volunteers and people working in social care, community groups and independent organisations also provide health support.

In this section we summarise general characteristics of the NHS workforce. This is because many NHS staff support people with cardiovascular disease, even if this is not their main role. We wanted to set the scene about the NHS workforce as a whole, to help us compare the cardiovascular workforce. In the next section we focus on workers whose main job is supporting people with cardiovascular disease.

Many of the examples in this section are drawn from official NHS statistics for **people working in NHS trusts in England** as of the final quarter of 2021. We know that England does not represent the other countries in the UK, but wanted to show some broad trends.

Employing organisations

Most NHS staff work in hospital and community services as employees of NHS trusts and commissioning organisations (1.2 million full-time equivalents). These include trusts providing acute hospital, ambulance, mental health and community services. Around 19,000 full-time equivalent staff work in integrated care boards in England or health boards in Scotland or Wales. In addition, around 140,000 full-time equivalent people work in primary care. This includes general practice and community pharmacy, dentistry and optometry.[5]

In England there are also at least 56,000 full-time equivalent staff employed in independent healthcare organisations that directly provide NHS services. We do not know these numbers for other parts of the UK.[6] *These numbers are important because if we focus workforce planning only on NHS employees we could miss key people who may provide some cardiovascular care.*

Clinical and non-clinical staff

About half of the total NHS workforce are professionally qualified clinical staff. The rest are frontline support staff and back office staff. This includes people working in estates, communications and education, either in local organisations or in centralised hubs.[7]

*This highlights that it may be useful to consider the **wide range of non-clinical and support roles** when planning cardiovascular workforce needs.*

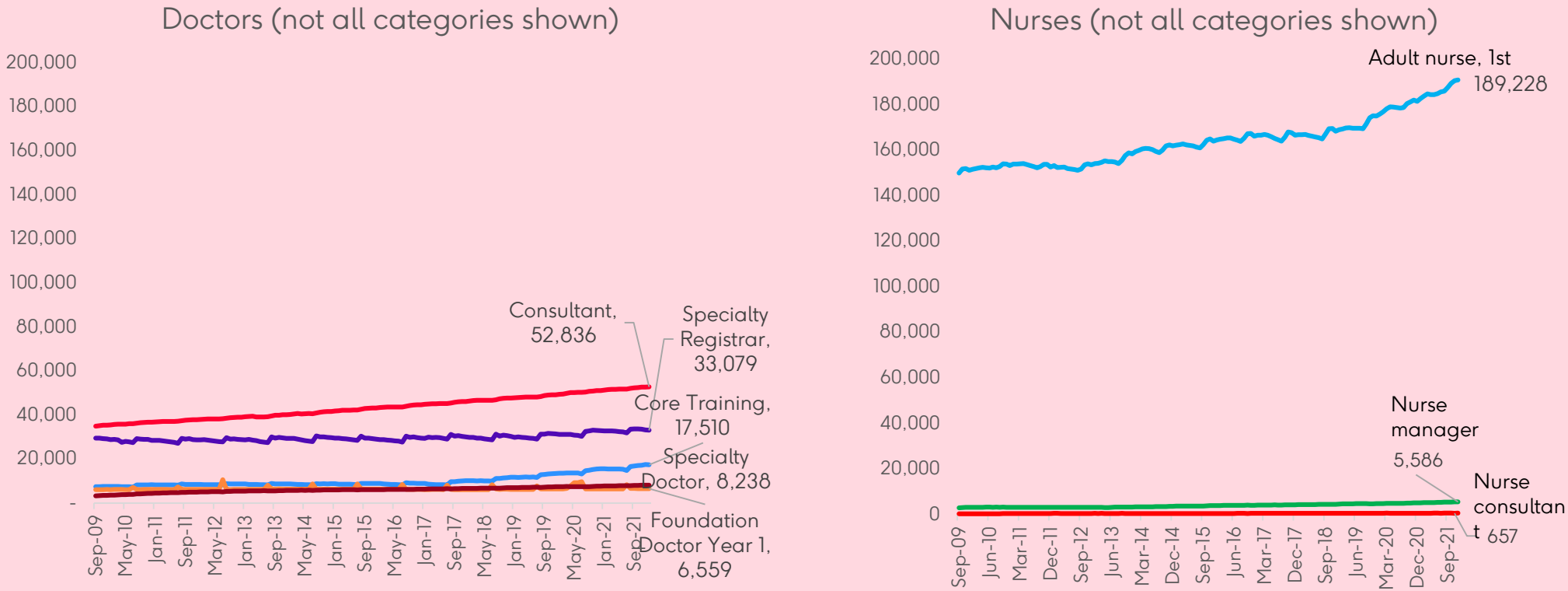
Doctors and nurses

Across all NHS hospital, community and primary care settings in the UK, there are about 160,000 doctors and 350,000 nurses and midwives (headcount).[8]

As an illustrative example of the growth in staff over time, Figure 1 shows the full-time equivalent (FTE) doctor and nurse numbers working in NHS hospital and community trusts in England.

However doctors and nurses make up about one third of the total workforce. *We may be missing out two thirds of the workforce if we focus mainly on doctors and nurses when exploring workforce trends.*

Figure 1: FTE numbers of different grades of doctors and nurses working in hospital and community trusts in England



Source: Adapted from provisional analysis by British Heart Foundation Health Intelligence Team using NHS England workforce statistics as of January 2022. Does not include doctors and nurses working in primary care. Foundation Doctor Year 2 trends are similar for Year 1 so are not shown separately.

Demographic characteristics[9]

Age
Around 10% to 20% of NHS workers are approaching retirement age. This varies depending on people's role. For example, 13% of NHS doctors across the UK are 55 years or older compared to 18% of people in nurse and health visitor roles.

Gender
Three quarters of the NHS workforce is female across the UK. This varies by role. For example, 46% of doctors of all grades are female and 88% of people in nurse and health visitor roles are female.

Ethnicity
About 78% of NHS staff in the UK whose ethnicity is recorded are from White ethnic groups and 22% are from other ethnic groups (compared to 13% of working age adults in the UK).

11% of NHS staff identify with Asian ethnic groups, compared with 7% of working age people in the population.

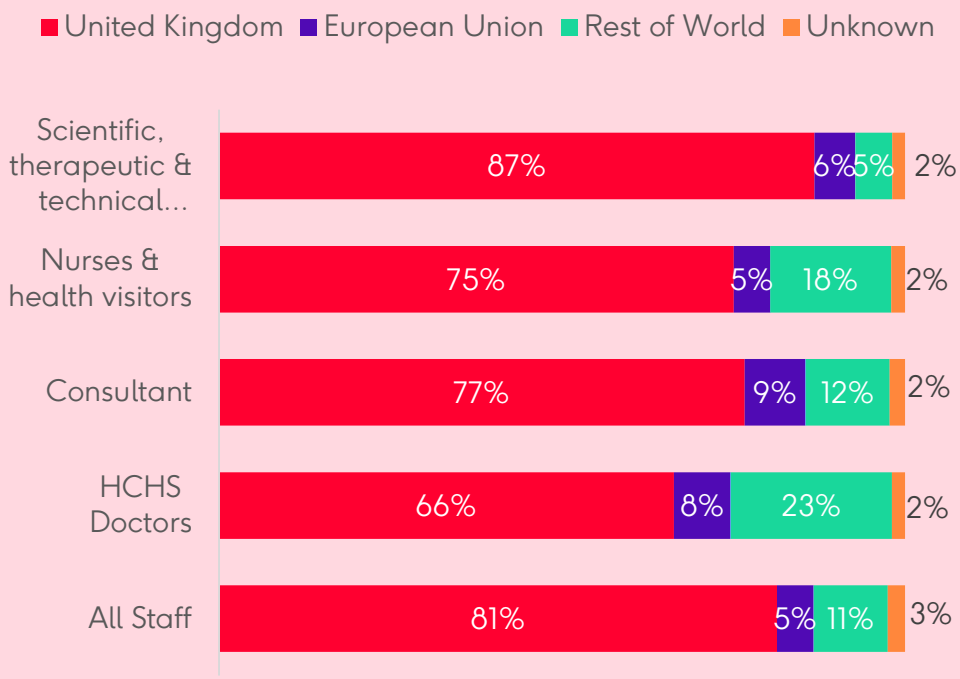
7% of NHS staff identify with Black ethnic groups compared with 2% of working age people in the population.

Both NHS proportions and population proportions vary depending on the geographic area, including both country and regions within individual countries.[10]

A high proportion of NHS staff from minority ethnic groups are in junior or middle pay band roles rather than senior grades. This trend is present in most professions.

Nationality
About one in five people working in NHS hospital and community trusts across the UK are nationals of countries other than the UK. Again the proportions vary by role. Up to one third of doctors are non-UK nationals compared with about one quarter of nurses and about one in ten scientific or technical staff (see Figure 2).

Figure 2: % of FTE staff of various nationalities



Source: Adapted from provisional analysis by British Heart Foundation Health Intelligence Team using NHS workforce statistics as of September 2021. Includes clinical commissioning group staff. Does not include doctors and nurses working in primary care. HCHS means hospital and community health service.

Workforce capacity

Growth trends

The UK has fewer staff in many groups compared to other developed countries. For example, in 2020 the UK had 8 nurses per 1,000 inhabitants compared to 18 per 1,000 inhabitants in Norway and Switzerland and 13 in Ireland. We have amongst the lowest level of doctors (3 per 1,000 inhabitants compared to 5 in Norway and 4 in Switzerland and Ireland).[11] We need to be cautious about these types of comparisons though, due to differences in how services are organised, population needs and how data are recorded.

The number of people working in the NHS is growing, but growth rates differ by role and sector. For example, on average there is about one hospital doctor or dentist for every 500 people in the population. This was one per 3,300 people in 1949, near to when the NHS began.[12]

The number of nursing staff has fluctuated recently. Full-time equivalent nurse numbers increased by less than 1% a year from 2009 until 2020. During the COVID-19 pandemic the numbers increased, with more fast track qualifiers and people returning to nursing. Children's nursing showed particular gains over time.

The number of full-time equivalent ambulance staff increased from 30,000 in September 2009 to 42,300 in February 2021. This was mainly due to a drive to increase paramedics. However, there is still a shortage. Ambulance staff are also more likely than others to report negative experiences in (England's) NHS staff survey, including lower wellbeing, morale and perceived diversity and inclusion.[13]

There are also vacancies and capacity issues in primary care. For instance, using England as an example, the number of full-time, fully qualified GPs decreased by about 6% in the 5 years between 2016 and 2021.[14] The number of general practice nurses in England has remained at about 17,000 full-time equivalent posts for many years. Seven out of ten practice nurses work less than full time. Around one-third are over 55 years old (35%).[15]

There have also been significant reductions in the number of community health nurses in England. For instance, full time equivalent district nurses have reduced by 45% between 2010 and 2021.[16]

Capacity to meet needs

The demand for health services is growing.

Analyses suggest that there are not enough staff to meet current and future demands for services. Taking England as an example, within the next 20 years the population is predicted to increase by 11% (to a total of 62 million by 2041). 2018 forecasts suggested that by 2030, there would be about 250,000 fewer NHS staff available than required to meet population needs.[17]

Staff shortages are not just a future prediction. As of March 2022, about 8% of full-time equivalent posts were vacant in England. This is about one out of every 12 posts vacant. Vacancies are not distributed evenly across the country, or likely across specialities. London has the highest proportion of full-time equivalent vacancies (11% as of March 2022).[18]

Not having enough people in post affects the amount and type of care provided as well as training. A 2019 a survey by the Royal College of Physicians found that four in ten consultants (40%) and six in ten senior trainee doctors (63%) across the UK said that there were gaps in hospital medical cover every day or week.[19] This likely increased during the COVID-19 pandemic. Gaps in rotas not only impact on care, but also mean that there are not enough senior medical staff to oversee training. This means that junior doctors may not be placed at a hospital, which reduces staffing further.

Staff experience

Information is more readily available about NHS staff experience in England compared to other parts of the UK. For example, over 648,000 staff responded to England's latest NHS staff survey, completed in autumn 2021. [20] Most participants were from NHS trusts.

The staff survey results paint a picture of a workforce that feels stressed and stretched, with only one quarter believing that there were enough staff in post:

- 43% said staff were able to meet all the conflicting demands on their time at work, a five-year low (down 4% from 2020).
- **27% said there were enough staff at their organisation for them to do their job properly** (down 11% from 2020).
- 57% said that had enough materials, supplies and equipment to do their work (down 3% from 2020).

A significant proportion did not feel well treated at work:

- 27% said they had experienced harassment, bullying or abuse from patients, carers or family members in the past 12 months, 12% from managers and 19% from other colleagues.
- 42% were satisfied with how much their organisation valued their work, the lowest for five years (down 6% from 2020).
- 32% did not feel that their organisation respected individual differences such as various cultures, working styles and backgrounds.
- 52% felt supported to develop their potential.
- 59% said they would recommend their organisation as a place to work (down 7% from 2020).

About half of staff felt that their work was having a negative impact on their health and life:

- 47% said they had felt unwell as a result of work-related stress in the past 12 months, the highest for five years.
- 39% said their work frustrated them, 38% said they found their work emotionally exhausting and 34% said they felt burnt out because of their work.
- 52% said they achieve a good balance between their work life and their home life.
- 52% said they looked forward to going to work (down 6% from 2020) and 67% said they were enthusiastic about their job (down 5% from 2020)

In terms of future plans:

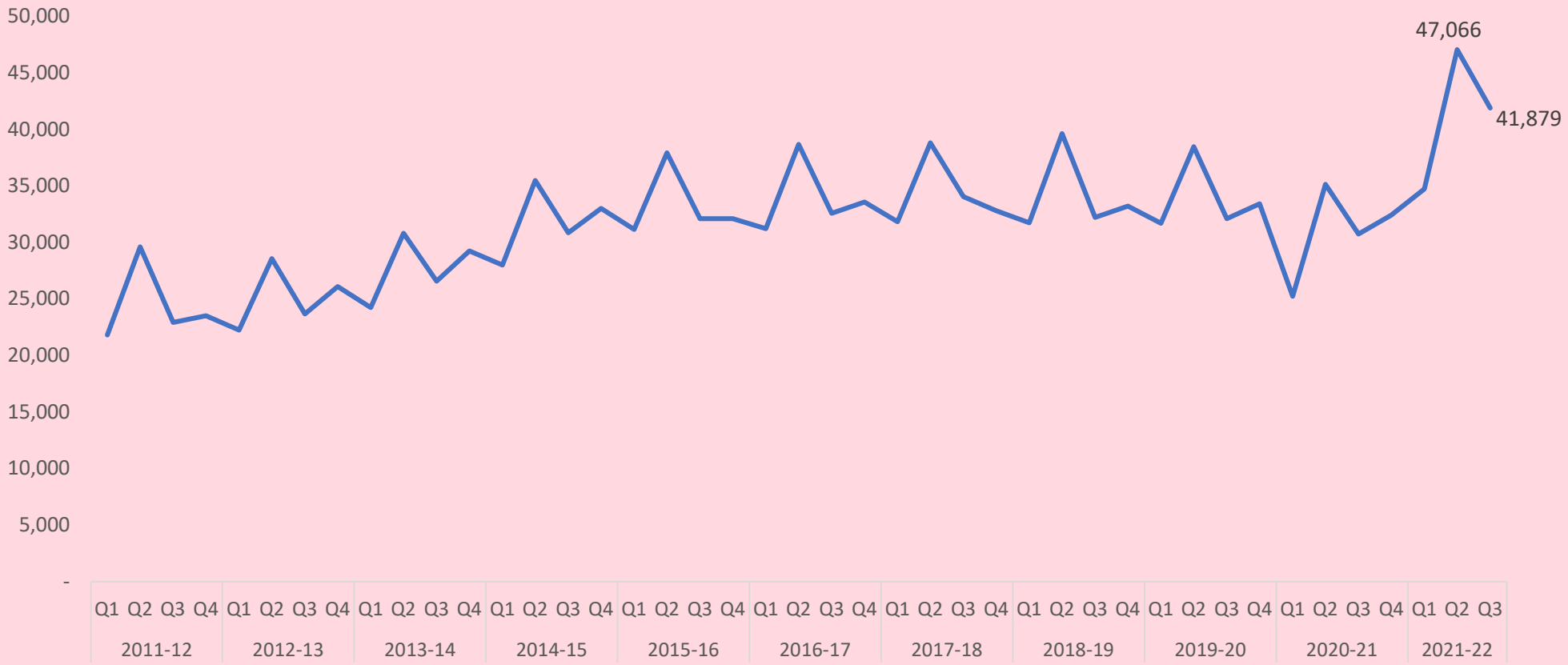
- **31% said they often thought about leaving their organisation**, a four-year high (up 5% from 2020).
- 23% said they will probably look for a job somewhere else in the next 12 months, a four-year high (up 3% from 2020).
- 17% said they would leave their organisation as soon as they could find another job, a four-year high (up 3% from 2020).

This information is not available specific to the cardiovascular workforce. We do not know of any reasons why trends would be significantly different, so the cardiovascular workforce probably also feels stressed and stretched.

Retention

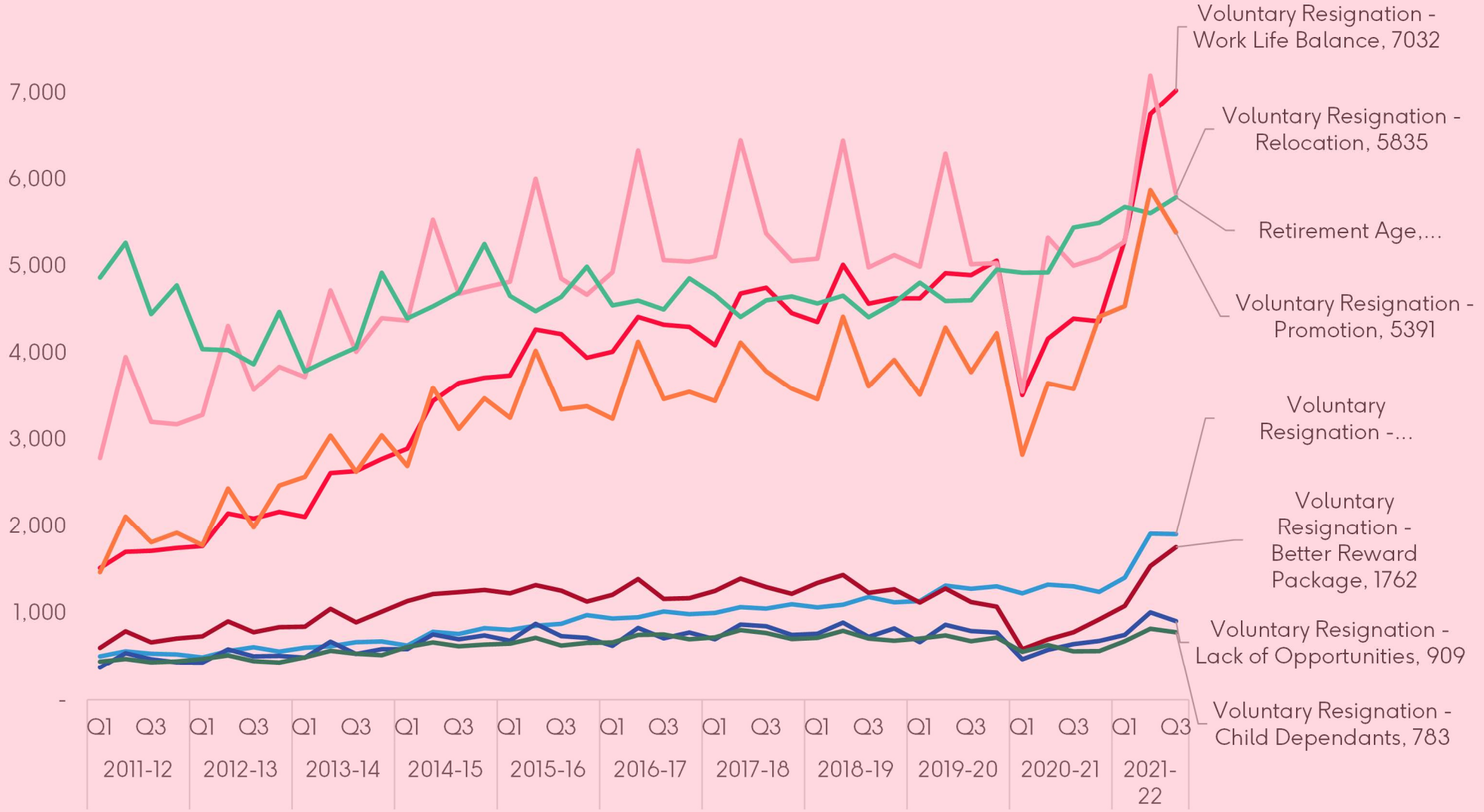
Given staff survey feedback, it is not surprising that over the past two years there has been an increase in the number of staff leaving their NHS roles. Using data from in England as an example, there has been a particular increase in staff citing work/life balance as a reason for leaving. There has also been an increase in staff being promoted to more senior roles (see Figure 3 and 4).

Figure 3: Number of staff leaving their NHS roles in England due to retirement or voluntary resignation



Source: Provisional analysis by British Heart Foundation Health Intelligence Team using NHS England workforce statistics, as of December 2021. These numbers make up about half of people leaving their roles. Other reasons for leaving not included in the numbers above include moving/leaving due to end of fixed term contracts, rotations ending and dismissals.

Figure 4: Trends in top reasons for leaving roles due to retirement or voluntary resignation



Source: Provisional analysis by British Heart Foundation Health Intelligence Team using NHS England workforce statistics. Not all top reasons are shown as the purpose is to illustrate changes in trends over time, where reasons were known. The reasons are based on the top 10 reasons for voluntary resignation or retirement as of quarter 3, 2021/22.

Cardiovascular workforce in hospital

In addition to general information about the NHS workforce, there is also some information about staff whose main role is to support people diagnosed with cardiovascular conditions. This section focuses on data for those working in acute hospital settings.

We describe UK-wide data first and then summarise the data available for each of the countries in the UK. UK-wide data often comes from professional societies or surveys, which people choose whether to complete. Country-specific data comes from NHS databases so is more complete, but may have a narrower scope.

We summarise data about the number of workers in different roles overall. However it is important to remember that the way that hospital cardiovascular care is delivered and staffed varies across the UK. There are differences between countries, between regions within a country and within specific organisations. There are also some differences depending on the conditions people have. Some large centres are self-sufficient, doing almost everything ‘in house’, whereas many centres use a ‘hub and spoke’ approach where smaller centres work closely with larger regional centres. The delivery model impacts on the number and type of staff at specific services.

UK wide workforce - diagnostic imaging roles

Echocardiographers

Cardiac physiology services are usually located in hospitals. They provide invasive and non-invasive diagnostic and therapeutic procedures. Healthcare scientists such as echocardiographers are a large part of the workforce delivering these services. They are trained technicians who perform and analyse ultrasound scans of the heart. They work with medical and specialist nursing staff for certain procedures.

People with a range of job titles undertake echocardiography. Statutory regulation is not currently mandatory for staff doing echocardiography in the UK.[21]

In 2021 the British Society of Echocardiography (BSE) surveyed echocardiography leads across the UK to gather information about workforce numbers and training. [22] 106 people responded, which is two thirds of echocardiography leads (68% overall, 74% in England, 80% in Scotland, 62% in Wales and 20% in Northern Ireland). Almost all leads said that their teams offered services across multiple sites.

Across 95 organisations, there were 1,366 people providing echocardiograms, or **1,089 full-time equivalents**.

58% of the workforce covered by the survey held BSE accreditation. 4% held European Association of Cardiovascular Imaging (EACVI) accreditation. 11% were pre-accreditation echocardiographers. The rest were unknown.

Pay ranged from Agenda for Change band 5 to 8c and speciality registrar/consultant level for medical grades. The most common pay was Agenda for Change band 7 and this was also the most common band for locums.

One third of the organisations represented in the survey had echocardiography support workers (38%).

Another survey undertaken for the British Society of Echocardiography in 2015 found that more than a third of departments had at least 50% of locum staff.[23]

New education and training programmes in cardiac science have been introduced at both entry and postgraduate level through the UK Modernising Scientific Careers programme. A higher specialist scientific training programme has been developed, similar to Speciality Registrar Grade level training.

Health Education England's (HEE) Scientific Training Programme has increased numbers in the cardiac physiology workforce, but there remains a shortage of accredited echocardiographers. HEE collaborated with the BSE to develop an 18-month full-time on the job Echocardiography Training Programme, with academic elements.[24] There were 400 applications for the first pilot cohort, with 12 places granted. This means *there may be a large number of people willing to train.*

The sites BSE surveyed in 2021 offered training to echocardiographers (92%) and cardiology specialty registrars (92%). Some offered critical care training (64%). However in qualitative feedback, echocardiography leads said they were concerned about the number of trainees. They felt that departments were not able to provide appropriate learning opportunities or support due to the workload and lack of staff.

The echocardiography workload has increased, with a backlog partly due to the COVID-19 pandemic, increased referrals for scans and lack of workforce capacity. In February 2020 4% of people referred for echocardiograms waited more than 6 weeks compared to about 40% in 2021 and early 2022.[25,26]

Organisations reported difficulty recruiting and retaining staff. Nine out of ten organisations were offering paid overtime. 16% had retention bonuses. Half had advertised but failed to appoint to vacant posts recently (53%).

The main reasons that workers had left roles recently included moving to do the role for a different employer, retirement or leaving the workforce, and moving to the private sector.

The BSE covered all four countries in the UK. The picture is similar across each country and mirrors other research. For example, in Scotland there has been a 46% increase in the demand for cardiac physiology services over the past five years. Most departments across Scotland have at least one vacancy (70%). Half of departments have vacancy rates of about 15%. About 15% of the workforce are within five years of retiring.[27]

Radiologists

Radiologists are specialist doctors who use medical imaging such as x-ray, magnetic resonance imaging (MRI), computed tomography (CT) and ultrasound to diagnose and treat people. Some radiologists specialise in cardiovascular conditions. Others see people with cardiovascular conditions as part of wider work.

For example, the European Society of Emergency Radiology surveyed 109 radiologists from across Europe, including the UK. They found that in half of organisations cardiac imaging was usually done by a cardiologist (53%) whereas non-cardiac vascular procedures were usually performed and interpreted by interventional radiologists.[28]

Research suggests that there are not enough radiologists and scanning equipment available to meet needs. The National Institute for Health and Care Excellence (NICE) recommended offering CT coronary angiography for patients with stable chest pain. A 2018 study estimated that each year 42,340 of these procedures are performed in the UK. The researchers estimated that 350,000 would be required to fully implement the NICE guidelines. However, there were only 198 accredited practitioners and 304 appropriate CT scanners across the UK. There were marked variations between geographical regions.[29]

The Royal College of Radiologists undertook a workforce census in 2020.[30] The data are not specific to the cardiovascular workforce, but illustrate trends that are likely to apply to radiologists specialising in cardiovascular medicine. The Royal College identified 433 consultant radiologist vacancies across UK hospitals. This means one in ten posts are vacant. In 2020, about two thirds of consultant vacancies remained unfilled after a year. There were not enough radiologists to fill the posts. The College estimated a shortage of 1,939 consultant radiologists across the UK. This is one third of the workforce. They forecast a shortage of 3,500 radiologists by 2025, a 44% shortfall. 100 additional trainee places were funded in 2021.

UK wide workforce - Cardiologists

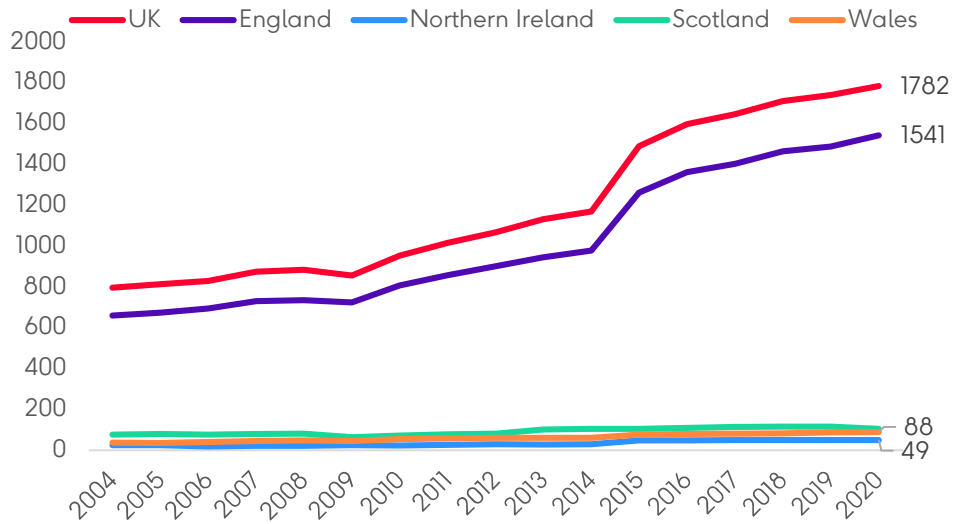
Cardiologists are doctors who diagnose, assess and treat people with cardiovascular disease, mostly in hospital. Most cardiologists undertake a variety of roles as part of their job plan, which may include:[31]

- cardiology clinics
- cardiology ward rounds
- consultant of the week ward rounds
- cardiology support for acute medical patients
- on-call work
- supervision of specialist nurses and others
- supporting community outreach
- specialist imaging sessions
- specialist catheter laboratory sessions
- multidisciplinary team meetings

The Royal College of Physicians undertakes a census of consultants and higher speciality trainees across the UK.[32] Based on this, as of 2020, there were about 1,700 consultant cardiologists working substantively for the NHS (headcount, see Figure 5). 9% worked less than full-time. This is lower than other specialties such as palliative care where 55% of consultants work less than full-time.[33]

There were about 860 higher speciality trainee cardiologists.[34] These are doctors undertaking 7 years of specialist training and practical experience to become consultant cardiologists (8 years from 2022). 6% work less than full-time.

Figure 5: Headcount of consultant cardiologists in the UK



Source: Royal College of Physicians 2020 Consultant Census Data Toolkit

The UK has fewer cardiologists per capita than in many comparable countries.[35] In 2015, the British Cardiovascular Society estimated that there were 22 cardiologists per million population.[36]

NHS England and NHS Improvement is modelling the speciality workforce needed to meet demand in England. It estimates that the current demand for cardiologist consultants in England is around 1,510 full time equivalents, with a current gap of 113 full time equivalents (vacancy rate about 8%). NHS England and NHS Improvement's analysis suggests that based on the current training pipeline, the gap will be filled by 2024/25.[37] However limitations with the data include differences across regions, potential differences in children's versus adult medicine and not accounting for current rates of staff leaving the NHS.

Cardiologist demographics

In the Royal College of Physicians census, 51% of cardiology consultants were 50 or older (51% in England, 45% in Northern Ireland, 56% in Scotland and 52% in Wales). 30% were 55 years or older (see Table 2).

Table 3 shows the geographic spread of consultants and Table 4 of higher specialty trainees in cardiology.

As of 2020, 85% of consultant cardiologists were male and 15% female. Whilst the proportion of female cardiology consultants is slowly growing (Figure 6), it remains lower than most other medical specialties in the UK.[38,39] The proportion of female cardiology higher specialty trainees is also growing over time, but is still less than one third of all cardiology higher specialty trainees so any changes to the overall consultant composition will take many years to come into effect.

The gender imbalance in UK cardiology trainees and posts reflects similar issues in many parts of the world. A recent international statement representing a wide range of countries highlighted that whilst women often outnumber men at medical schools, the number of women in cardiology remains low. The consensus was that women are also disproportionately affected by systemic issues within challenging cardiology work environments, a gender pay gap, and domestic responsibilities which limit their professional progression.[40]

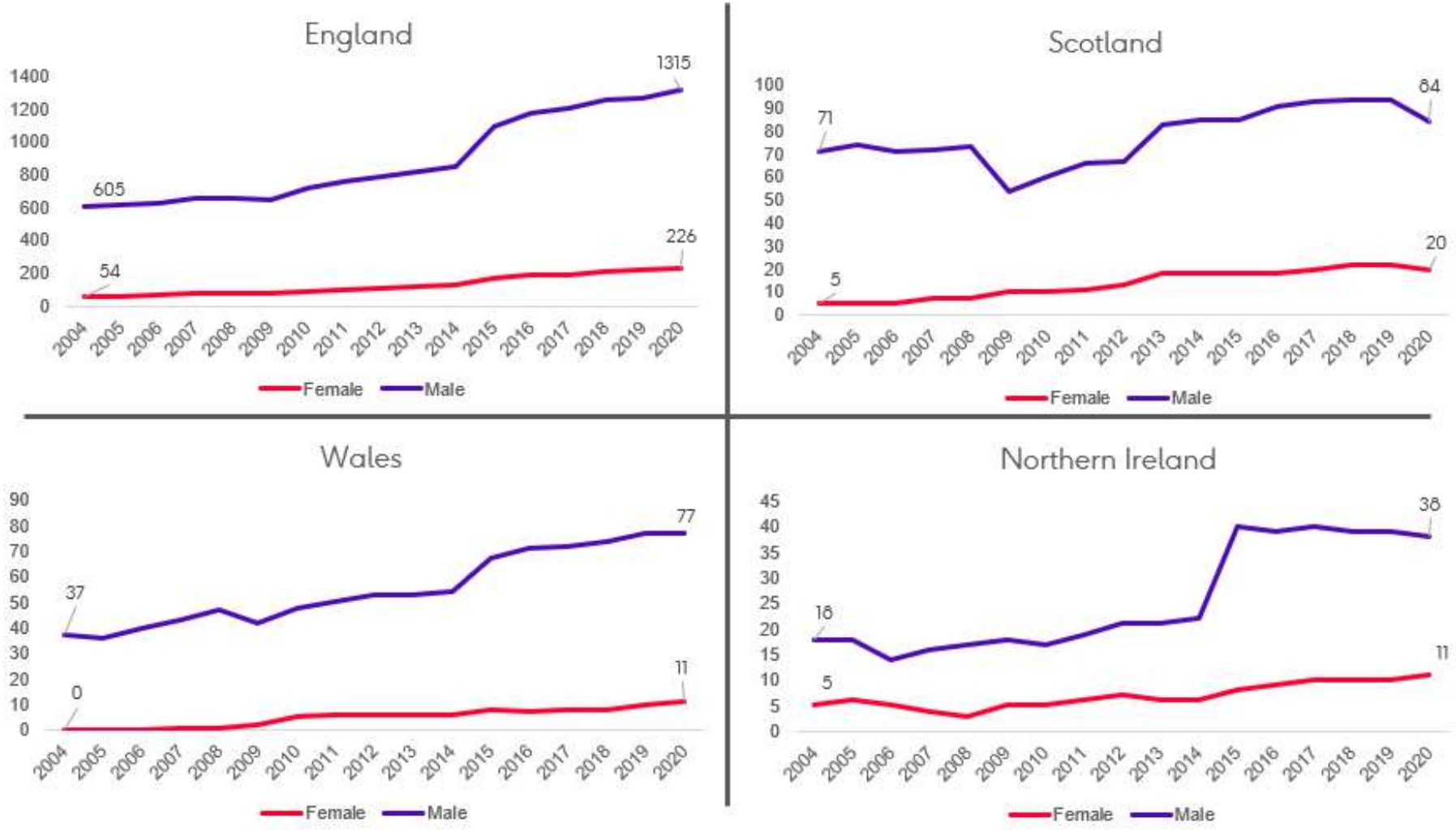
Little is known about ethnicity. Research found that people applying for consultant cardiology posts in the UK may be less likely to be successful than those applying to be consultants in acute medicine. Those from minority ethnic groups were less likely to progress quickly along the cardiology consultant route than those from White ethnic groups, though this was also the case for other specialities.[41]

Table 2: Age group of consultant cardiologists in UK countries (headcount, 2020)

	UK	%	England	%	Scotland	%	Wales	%	Northern Ireland	%
34 or younger	3	<1%	3	<1%	0	0%	0	0%	0	0%
35 to 39	80	4%	73	5%	2	2%	3	3%	2	4%
40 to 44	365	20%	319	21%	20	19%	17	19%	9	18%
45 to 49	371	21%	318	21%	21	20%	18	20%	14	29%
50 to 54	381	21%	326	21%	21	20%	25	28%	9	18%
55 to 59	279	16%	244	16%	15	14%	11	13%	9	18%
60 to 65	177	10%	149	10%	16	15%	8	9%	4	8%
Older than 65	79	4%	71	5%	6	6%	2	2%	0	0%
Unknown	47	3%	38	3%	3	3%	4	5%	2	4%
Total	1782		1541		104		88		49	

Source: Royal College of Physicians 2020 Consultant Census

Figure 6: Gender of consultant cardiologists in UK countries (headcount)



Source: Royal College of Physicians 2020 Consultant Census Data Toolkit

Table 3: Gender and geographic spread of consultant cardiologists in the UK

Nation	NHS region	Sub-region	Female (headcount)	Male (headcount)	Total headcount	Total FTEs	Population	Population per FTE
England	London	London - Central and North East	24	126	150	141	3,563,052	25,298
		London - North West	19	96	115	94	2,111,469	22,426
		London - South	16	59	75	73	3,327,967	45,463
	Midlands and East	East Midlands	16	91	107	100	4,865,583	48,733
		East of England	23	107	130	126	6,269,161	49,636
		West Midlands	20	131	151	148	5,961,929	40,221
	North	North West	25	190	215	206	7,039,306	34,091
		Northern	11	66	77	72	2,730,400	37,736
		Yorkshire and the Humber	15	123	138	132	5,804,863	43,949
	South	Kent, Surrey and Sussex	19	106	125	121	4,635,942	38,332
		South West	17	116	133	129	4,932,192	38,153
		Thames Valley	11	50	61	55	2,431,905	43,987
		Wessex	7	43	50	40	2,876,369	72,542
Northern Ireland		Northern Ireland	11	38	49	36	1,895,510	52,046
Scotland	Scotland	Scotland - East	2	8	10	8	416,550	52,069
		Scotland - North	4	16	20	16	978,180	63,032
		Scotland - South	3	22	25	23	1,401,860	61,424
		Scotland - West	14	49	63	59	2,669,410	44,933
Wales	Wales	Wales - North	–	13	13	11	703,361	62,428
		Wales - South	11	64	75	63	2,466,225	39,378
Total			**268**	**1,514**	**1,782**	**1,655**	**67,081,234**	**40,539**

Source: Royal College of Physicians 2020 Consultant Census Data Toolkit

Table 4: Gender and geographic spread of cardiology higher specialty trainees in the UK

Nation	NHS region	Sub-region	Female	Male	Total headcount	Total FTEs	Population	Population per FTE
England	London	London	55	167	222	219	8,961,989	40,978
	Midlands and East	East Midlands	13	35	48	48	4,835,928	101,809
		East of England	20	53	73	73	6,236,072	85,909
		West Midlands	10	42	52	51	5,934,037	116,582
	North	North West	21	62	83	82	7,013,321	85,842
		Northern	14	35	49	48	2,719,686	56,660
		Yorkshire and the Humber	16	47	63	63	5,781,097	92,203
	South	Kent, Surrey and Sussex	13	44	57	56	4,619,443	82,343
		South West	18	26	44	42	4,902,479	116,448
		Thames Valley	10	21	31	31	2,419,956	79,343
		Wessex	15	28	43	42	2,862,953	67,682
Northern Ireland		Northern Ireland	8	19	27	27	1,893,667	70,659
Scotland	Scotland	Scotland - East	1	6	7	7	417,470	59,639
		Scotland - North	3	7	10	10	979,310	97,931
		Scotland - South	3	12	15	15	1,396,640	93,109
		Scotland - West	9	22	31	30	2,669,880	88,700
Wales		Wales	17	31	48	47	3,152,879	66,516

Source: Royal College of Physicians 2018/19 Higher Speciality Trainee Census Data Toolkit[42]

UK wide workforce - Cardiovascular surgeons

Cardiothoracic surgeons

The Society for Cardiothoracic Surgery in Great Britain and Ireland analysed the workforce providing adult cardiac surgery in 2019.[43] There were 35 hospitals in the UK providing adult cardiac surgery: 29 in England, three in Scotland, two in Wales and one in Northern Ireland. There were no immediate plans to develop new cardiac surgery units. Some units have or will merge.

The Society reported that adult cardiac surgery activity was steady over the previous five years, with about 35,000 procedures per year in the UK and Ireland. They predicted increases in the complexity of surgery due to the ageing population, but not significantly increased numbers.

The Society reported that standard job plans for most cardiac surgeons include operating for an equivalent of two days per week, half a day in an outpatient clinic, half a day attending multidisciplinary team meetings, patient administration and ward rounds, audit and continuing medical education and teaching and research. On-call requirements for emergencies varies between a 1:4 and a 1:8 rota depending on the size of the unit and team.

In 2019 there were 257 consultant surgeons doing cardiac surgery, 211 of whom worked in England. Most consultants doing adult cardiac surgery specialised exclusively in this. 17% also did thoracic surgery and 12% cardiac transplant surgery.

Consultants working in cardiac surgery were aged between 35 and 68 years, with an average age of 50. 58% were over the age of 50 and 11% older than 60 years. Only 7 (3%) were women.

41% qualified in medicine outside the UK and Ireland. 19% did their cardiothoracic specialist training abroad.

Cardiothoracic trainees had a different demographic profile, with more qualifying in the UK and Ireland and a higher percentage of women.

An earlier study the demographic characteristics of consultant cardiothoracic surgeons found that consultant numbers increased by 83% overall between 1999 and 2014. But only 5% of consultant cardiothoracic surgeons were female. Fewer UK medical graduates entered the speciality during this period. Appointments of consultants from Europe quadrupled during this period. 59% of congenital heart surgeons, 46% of thoracic surgeons and 36% of adult cardiac surgeons were overseas graduates. Only one third of trainee surgeons were UK graduates (32%).

The researchers reported that cardiothoracic surgery had the lowest proportion UK graduates compared to other all other specialities apart from obstetrics and gynaecology. In comparison, in cardiology, 77% were UK graduates.[44]

Vascular surgeons

Vascular surgery became a new specialty in 2013. It is one of the smaller physician specialty workforces. In 2013 the Vascular Society of Great Britain and Ireland surveyed the vascular surgery workforce. 352 consultant vascular surgeons working in 95 NHS trusts took part, from all countries of the UK (78% response rate).[45] There were nine times as many male consultant vascular surgeons as females (92% men versus 8% women). The average age was 51 years, with 24% older than 55.

Vascular surgeons usually worked full-time for the NHS (93%). Their team size ranged from two to 10 surgeons, with an average of five. Over 80% worked in large trusts in teams of four surgeons or more.

Most worked more than the recommended standard consultant contract of ten programmed activities per week. Most said they worked more than 50 hours per week (60%). One in five said they worked more than 60 hours per week (21%).

People who responded to the survey said they felt stressed at work on a weekly basis due to long hours and managing a significant emergency workload on top of routine work. One third planned to retire within the next 10 years (34%).[46]

At that time the National Vascular Registry identified 458 surgeons in the UK conducting AAA repair. The Society estimated that this meant that there was one surgeon per 137,000 population equipped to deal with vascular surgery emergencies. The Society estimated that this level should be nearer to one per 100,000 population to meet future need. They identified likely increased levels of part-time working and career breaks, overstretched consultant job plans, emergency duty rotas and working hours, and a need to provide seven-day services as drivers of workforce pressures. They also stated that dual-consultant operating for major procedures is becoming common to increase safety and because fewer trainees are available to assist. This also requires an increase in consultant numbers.

Cardiothoracic anaesthetists

The Royal College of Anaesthetists 2020 workforce survey estimated that there are over 400 consultant anaesthetists who specialise in cardiac medicine as part of their role.[47]

In 2016 the Association for Cardiothoracic Anaesthesia and Critical Care undertook a survey and analysis of workforce issues in adult cardiothoracic centres in the UK. At that time the number of consultant cardiothoracic anaesthetists in each department varied from 7 to 40. Three quarters also did sessions in non-cardiothoracic anaesthesia.

Most centres did not have separate on-call rotas for cardiothoracic anaesthesia or cardiothoracic intensive care. If centres provided separate consultant rotas in line with guidelines, 78 additional consultants would be needed across the UK.[48]

Surgical care practitioners

Health services are testing new ways of working and different roles to address workforce shortages. The principle is to train people who may have fewer formal clinical qualifications to undertake roles that may traditionally have been done by doctors or other professionals. Surgical care practitioners are an example.

The NHS first introduced surgical care practitioners in the field of cardiothoracic surgery over 20 years ago, recognising shortages of junior doctors. The role has subsequently been used in other surgical specialties. People taking on these roles must be registered with a professional body so can be either nurses or allied health professionals. Most trained as nurses. There is a structured training and examination process for these roles. However there is no mandatory regulation or requirement to register with a professional body, which makes it difficult to identify numbers.

A survey by the Association of Cardiothoracic Surgical Assistants identified 320 qualified cardiothoracic surgical care practitioners in the UK. This is about one third of all surgical care practitioners across all specialties.[49]

A systematic review identified ten relevant studies about the impact of surgical care practitioners on the workforce or patient outcomes. Only one focused solely on cardiothoracic surgical care practitioners. The reviewers concluded that these roles were of benefit to the workforce, added value to surgical teams and provided safe practice.[50]

UK wide workforce - Congenital cardiovascular care

Congenital conditions are those we are born with.

Of the 460 certificates of completion of training (CCT) awarded in adult cardiology in the UK between 2016 and 2020, 3% (15) included adult congenital heart disease. 60% of completers were female. [51]

In 2021 the British Congenital Cardiac Association analysed staff numbers across Level 1 adult congenital heart disease medical and surgical units in the UK. They identified 55 full-time equivalent adult congenital heart disease cardiologists based in 11 Level 1 centres. NHS England national standards expect 90 full-time equivalents, or one consultant per 1500 people with adult congenital heart disease.

There were also small numbers of adult cardiologists with a specialist interest in Level 2 (adult congenital heart disease medical units) and Level 3 units (district general hospitals). Many patients receive care from adult cardiologists with an interest in congenital heart disease close to where they live rather than being able to access specialist centres. These cardiologists often learn through clinical experience rather than formal training. Opportunities to acquire these skills may be reducing. Yet the number of adults with congenital heart disease is expected to increase over the next 30 years, including moderate and complex cases.[52]

The British Congenital Cardiac Association also analysed consultant staffing in UK congenital cardiac services over a 10-year period.[53] As of mid-2020 there were 218 (202 full-time equivalent) consultant cardiologists and surgeons working in Level 1 centres. This included 38 full-time equivalent surgeons, 128 FTE paediatric cardiologists, and 35 FTE adult congenital heart disease cardiologists. 74% of consultants had joined the NHS within the last 10 years.

Almost half of the consultant staff within UK congenital cardiac services left over the past ten years. Staff turnover over the 10-year period was 42% overall, including 56% of surgeons, 42% of paediatric cardiologists and 29% of adult congenital heart disease cardiologists.

Most leavers moved to posts outside the UK (43% of leavers) or retired (25%). Things that people said motivated them to leave included not feeling valued or respected; lack of time allocated to training, research and personal development; fragmented teams and ways of working; poor work/life balance; poor pay and conditions; lack of stability of the service due to national reviews; and lack of research funding opportunities.

36% of new posts were filled by consultants who did their specialist training outside the UK.

The Society for Cardiothoracic Surgery in Great Britain and Ireland found similar trends. They predicted that over the next decade, 15 to 20 new congenital cardiac surgeons will be needed to account for people moving abroad and retiring.[54]

Congenital cardiovascular care is not equitably distributed across the UK. One survey found a ten to 20-fold difference in referral and genetic testing rates for inherited cardiovascular conditions between different UK regions. London had higher service provision than most other regions, per head of population.[55]

UK wide workforce - Children's cardiac care

In 2019, the Royal College of Paediatrics and Child Health estimated that there was a gap of 856 paediatric consultants across the UK.[56] This is not specific to cardiovascular medicine but following a review of children's services in 2012/13, NHS England recommended that specially trained paediatricians with expertise in cardiology should provide children's cardiology services in all non-specialist hospitals. A 2016 study examined children's cardiology services in UK district general hospitals. 80% of hospitals responded to a survey. Two thirds of these hospitals had access to paediatricians with expertise in cardiology (68%). Two thirds provided local cardiology clinics led by paediatricians with expertise in cardiology (68%). Nine out of ten offered specialist outreach clinics (87%).[57]

UK wide workforce - Cardiovascular nurses

Advanced nurse practitioners

Roles vary but in general advanced nurse practitioners tend to work in intensive care units, surgical wards and clinics whereas surgical care practitioners work in operating theatres. There is wide variation in the training and scope of advanced nurse practitioners.

The Society for Cardiothoracic Surgery in Great Britain and Ireland examined advanced nurse practitioners in cardiothoracic surgery. They reported that it is difficult to identify numbers because there is no mandatory regulation or registration.[58] They attempted to survey all centres in the UK and Ireland to establish workforce numbers but received a low response. Feedback from 113 advanced nurse practitioners and trainees found that 80% had teaching responsibilities, two- thirds were involved in audit (69%) and four out of ten in service evaluation (45%) and research (41%). The posts were not equally distributed across regions.[59]

Other nurses

Based on information from NHS workforce statistics across the UK countries, as of late 2021 there were over 10,000 nurses working in cardiovascular care (work area) in hospital and in the community, but we do not know the exact breakdown of roles. The European Society of Cardiology surveyed 876 cardiovascular nurses in the UK and 25 other countries about their role and education.[60] Most had degrees and half had a Masters degree or doctorate. Most were eager to continue their educational development. However four in 10 said they were not fully prepared for their job (44%). The main gaps they perceived in their training were in acute care and managing risk factors.

In terms of academic roles, in 2019 there were seven nursing professors with a cardiovascular background in the UK (2% of all nursing professors).[61]

Acute hospital workforce in England

It is possible to break down some of the data about the hospital cardiovascular workforce by country. Most of the available data focuses on doctors.

In 2021, England's Getting it Right First Time programme summarised some of the key cardiovascular workforce roles and capacity issues in England:[62]

- **Consultant cardiologists** are senior specialised doctors. There is about one consultant cardiologist per 41,335 people in the population. There is significant regional variation. The north of England has the best ratio of consultant cardiologists to the population, with one consultant per 36,000 people. Health Education England (HEE) caps training numbers for consultants. There are about 780 people training, with disproportionately high numbers in London compared to the population size.[63]

- The Getting it Right First Time programme suggested that **specialty and associate specialist doctors** could contribute to under-staffed general cardiology on-call rotas given the lack of consultant cardiologists.

- **Physician associates** are non-medical health or life science graduates who have completed postgraduate training. These roles can admit patients, perform some diagnostics and provide health promotion and disease prevention advice. In future physician associates will be able to prescribe within their defined scope of practice.

- **Advanced clinical practitioners and specialist nurses** can triage patients, deliver clinics, prescribe independently and do extended roles such as implanting loop recorders. It is estimated that to deliver the NHS Long Term Plan three to four full-time equivalent heart failure specialist nurses are needed per 100,000 population,[64] an increase from previous estimates.[65]

- **Cardiac physiologists** (health scientists) are health or life science graduates who have completed postgraduate training. They undertake scans and provide treatment support. There is a major shortfall due to a lack of trainee places in the national training scheme and poor retention, partly due to limited career progression. About 760 new cardiac physiologists are needed over the next ten years (460 in echocardiography).

- Community diagnostic hubs are being rolled out but there is a shortage of radiographers in hospital and the community. Between 10% and 15% of **radiographer** posts are vacant.[66]

Based on NHS databases,[67] in England as of the end of 2021 there were about **26,000 full-time equivalent roles in cardiovascular care** in hospital and community trusts.

Six out of ten were doctors or nurses (59%). The rest included scientific and technical team members, frontline and back room support staff and managers (see Table 5).

This included:

- **3,500 full-time equivalent doctors working in cardiology** (including trainees). The number has grown over time, largely as a result of growth in cardiologist consultants. This is in line with growth trends in consultant numbers in the NHS as a whole. There were around 1,500 full-time equivalent cardiology consultants and 900 full-time equivalent cardiology specialty registrars (see Figure 7)

- **900 full-time equivalent people working in cardiothoracic surgery** (including trainees). This includes about 400 full-time equivalent consultant cardiothoracic surgeons and about 300 full-time equivalent specialty registrars (see Figure 8)

- 4,000 full-time equivalent cardiac, vascular, respiratory and sleep healthcare scientists, not including support roles and trainees. Based on other data it appears about **1,300 were cardiac physiologist roles**

- 16,00 full-time equivalent **radiography** team members, not all of whom will be specific to cardiovascular care. This does not include support roles or trainees

Table 6 shows how these staff were spread across different regions in England.

Figure 7: FTE doctors working in cardiology in England

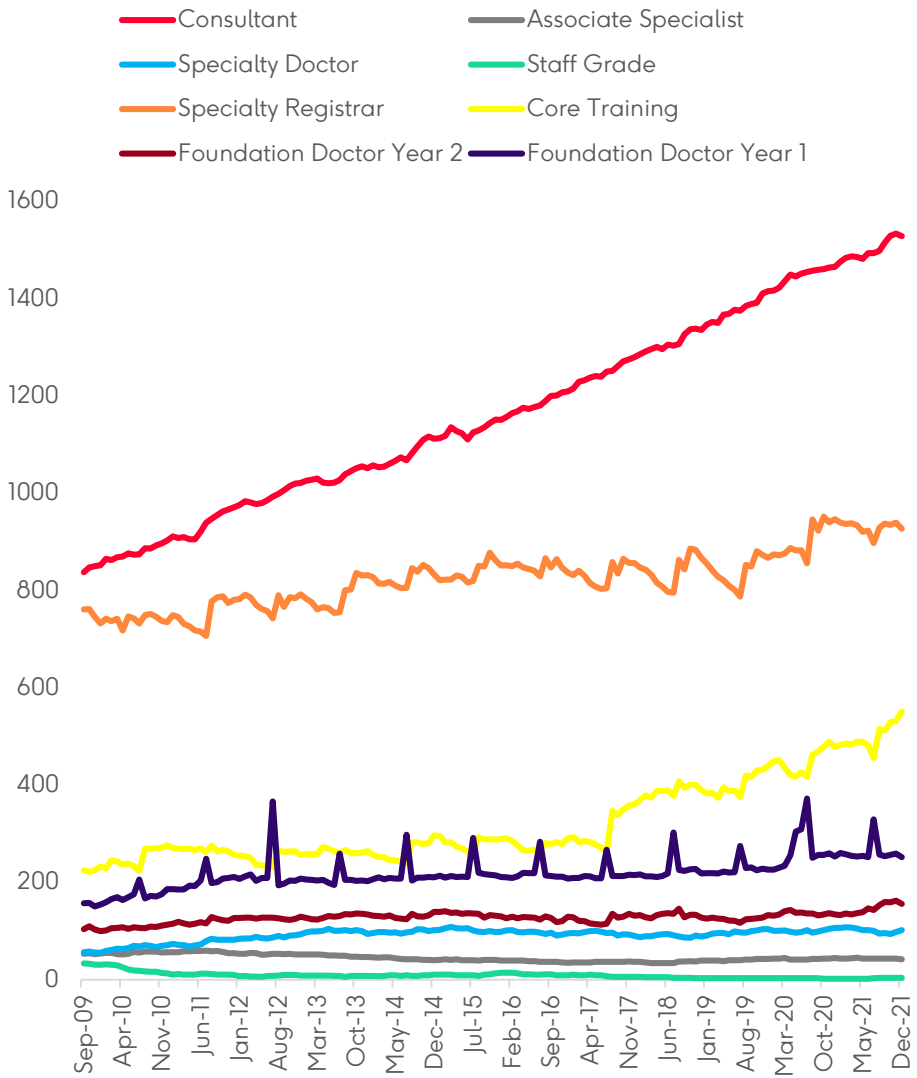
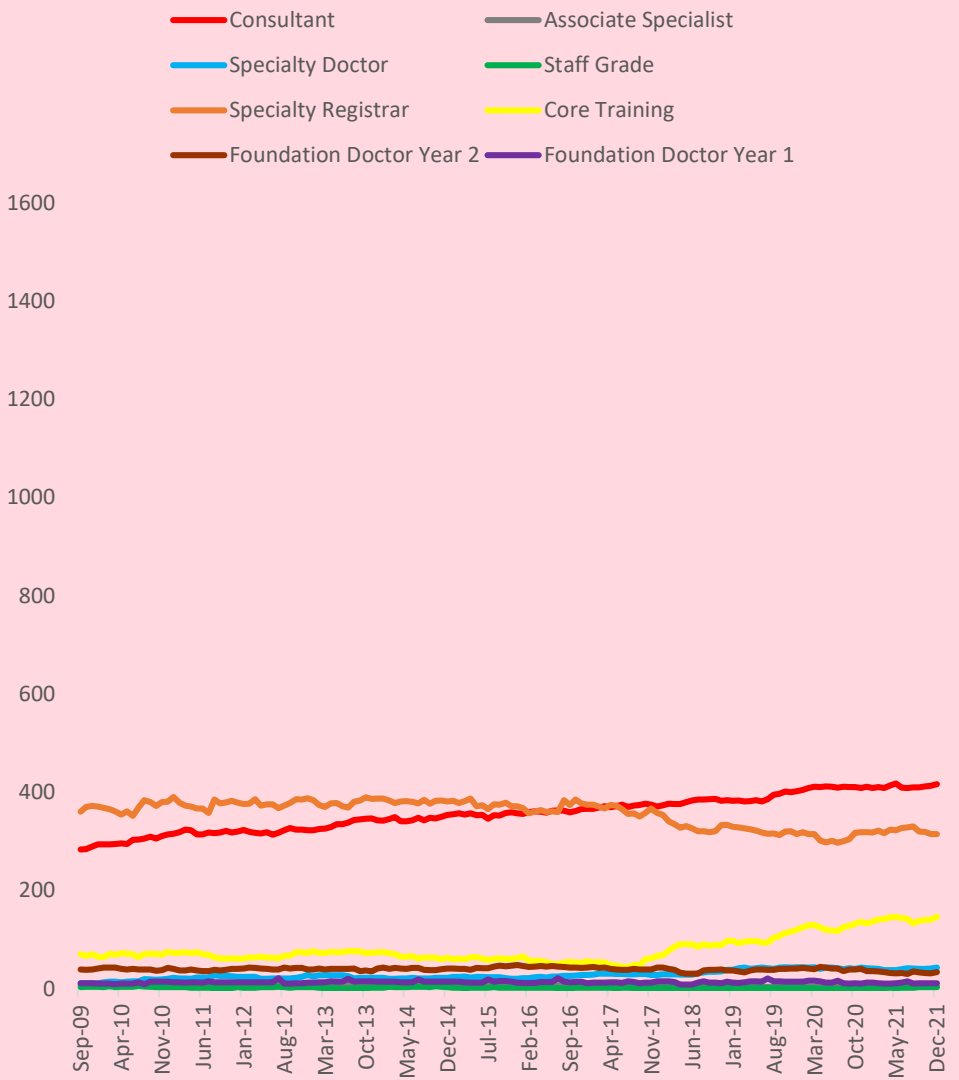


Figure 8: FTE working in cardiothoracic surgery in England



Source for figures and tables in this section: Provisional analysis by British Health Foundation Health Intelligence Team using NHS workforce statistics, as of December 2021. The exact numbers are not shown as the purpose is to illustrate trends over time.

Table 5: FTE staff with a cardiovascular role ('work area') working in England hospital and community trusts (Dec 2021)

Work area	Doctors	Nurses & health visitors	Midwives	Ambulance staff	Scientific, therapeutic & technical staff	Support to doctors, nurses & midwives	Support to scientific staff	Central functions	Property & estates	Senior managers	Managers	Other / unknown
Cardiology	3,588	8,245	0	7	2,820	4,631	1,098	307	62	14	57	12
Cardio-thoracic surgery	978	2,221	0	0	300	946	43	18	27	2	5	1
Paediatric cardiology	215	449	1	0	3	115	3	3	12	0	4	2
Cardiac, vascular, respiratory and sleep sciences	1	27	0	0	267	22	142	5	0	0	1	0
Total	**4,782**	**10,942**	**1**	**7**	**3,390**	**5,714**	**1,286**	**333**	**101**	**16**	**67**	**15**

Table 6: Region of cardiovascular workforce at trusts in England (FTE, Dec 2021)

Region	Doctors	Nurses & health visitors	Midwives	Ambulance staff	Scientific, therapeutic & technical staff	Support to doctors, nurses & midwives	Support to scientific staff	Central functions	Property & estates	Senior managers	Managers	Other / unknown	Total
London	1,094	2,044	0	1	724	803	163	152	15	4	20	7	**5,027**
South West	434	1,204	0	1	317	614	133	14	4	1	4	1	**2,727**
South East	590	1,307	1	1	408	524	140	21	7	0	10	0	**3,009**
Midlands	826	1,980	0	3	564	1204	262	28	32	0	11	7	**4,917**
East of England	473	1,017	0	1	313	581	114	37	16	2	3	0	**2,557**
North West	649	1,559	0	0	559	878	263	45	12	7	5	0	**3,977**
North East and Yorkshire	717	1,832	0	0	505	1,109	211	34	16	2	15	0	**4,441**

Table 7: Cardiovascular doctors by specialty in England (FTE, Dec 2021)

Region	Cardiology	Paediatric cardiology	Cardiothoracic surgery
All of England	3,565	247	981
London	1,518	213	532
South West	712	42	127
South East	955	52	177
Midlands	1,253	87	344
East of England	727	-	184
North West	914	22	332
North East and Yorkshire	1,051	79	267

Source: NHS England workforce statistics, December 2021. Table 6 is based (secondary) work area being cardiology, cardiothoracic surgery, paediatric cardiology, or cardiac, vascular, respiratory and sleep sciences. Table 7 is based on 'specialty' which NHS Digital suggests may be more accurate data.

Acute hospital workforce in Northern Ireland

The NHS does not publicly release data about the cardiovascular workforce in Northern Ireland. Some of the UK-wide surveys and census data reported earlier include breakdowns for Northern Ireland (in particular consultant numbers), but these are not official statistics.

Acute hospital workforce in Wales

NHS data suggests that as of December 2021, in Wales there were around:

- 147 full-time equivalent doctors working in cardiology
- 37 full-time equivalent doctors working in cardiothoracic surgery
- 7 full-time equivalent doctors working in paediatric cardiology

Data are available to allow division by health board area.

Data are not reported publicly about the demographic characteristics of these doctors. Nor are data available about the cardiovascular nursing or physiologist workforce in Wales or other roles.

Figure 9: FTE doctors working in cardiology in Wales

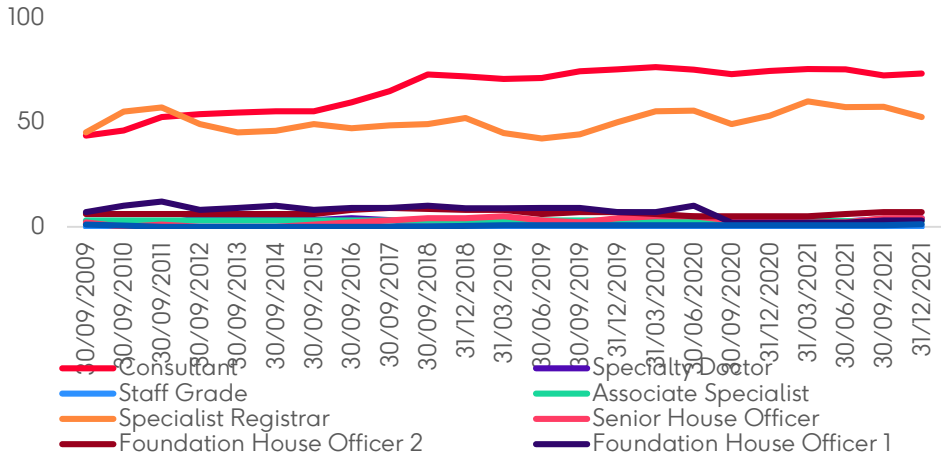
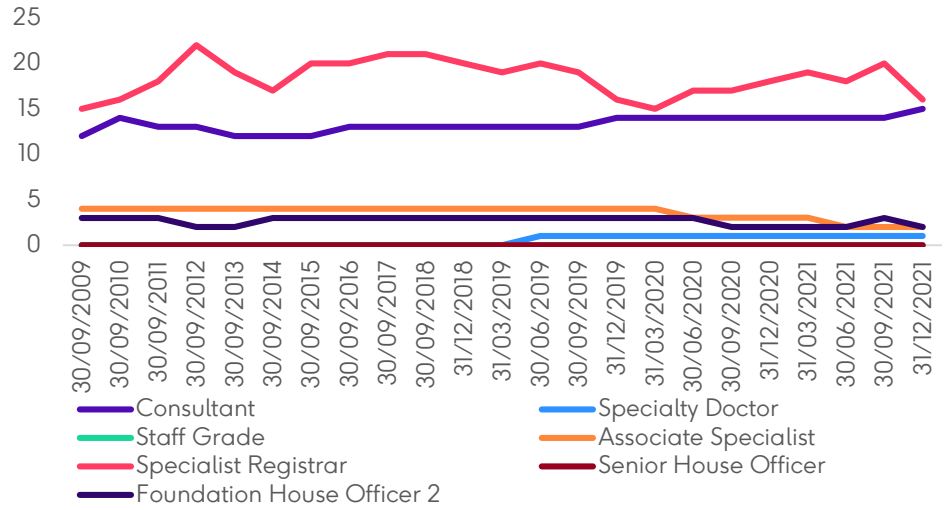


Figure 10: FTE cardiothoracic surgery doctors in Wales



Source: Provisional analysis by British Heart Foundation Health Intelligence Team using NHS workforce statistics, as of December 2021.

Acute hospital workforce in Scotland

NHS data suggests that as of September 2021, in Scotland there were around:[68]

- 246 full-time equivalent doctors working in cardiology. Around 130 of these were consultant cardiologists, 23% of whom were aged 55 years or older
- 78 full-time equivalent doctors working in cardiothoracic surgery. Around 30 of these were consultant surgeons
- 13 full-time equivalent doctors working in paediatric cardiology. 8 of these were consultants

Data are available to allow division by Scottish region.

Between 2011 and 2021 the proportion of female cardiology consultants increased from 17% to 25% (see Figure 11).

Data are not reported publicly about the cardiovascular nursing or physiologist workforce or other roles in Scotland.

Figure 11: % female FTE doctors in cardiology in Scotland

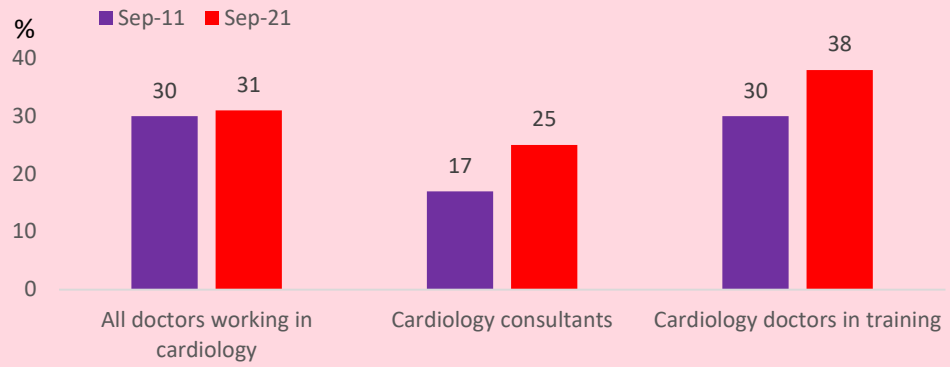


Figure 12: FTE doctors working in cardiology in Scotland

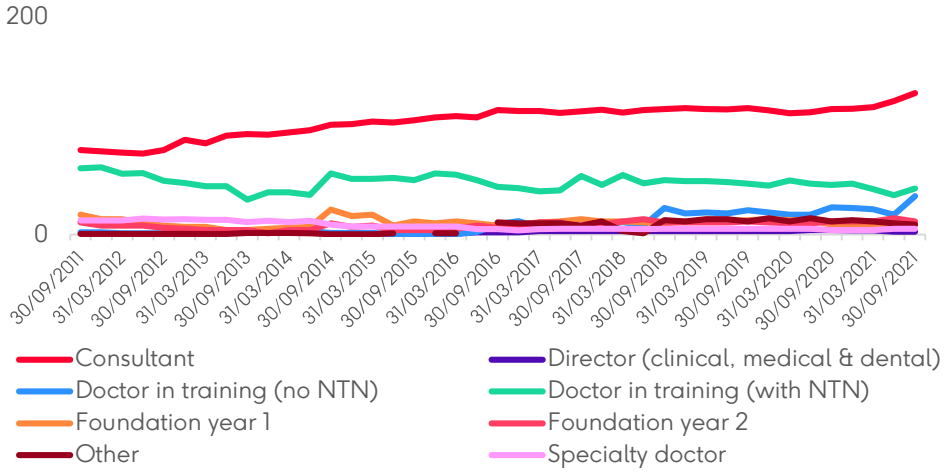
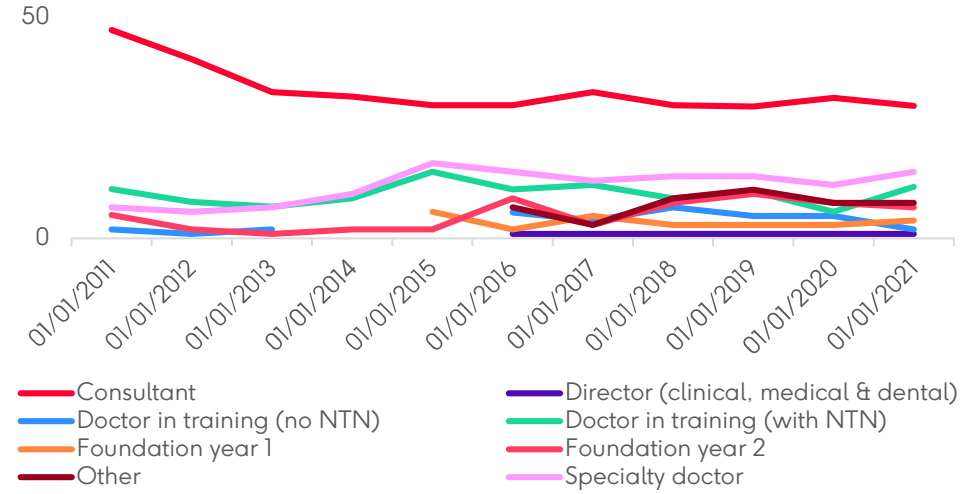


Figure 13: FTE cardiothoracic surgery doctors in Scotland



Source of all figures on this page: Provisional analysis by British Heart Foundation Health Intelligence Team using NHS statistics as of September 2021. NTN = National Training Number.

Cardiovascular workforce in the community

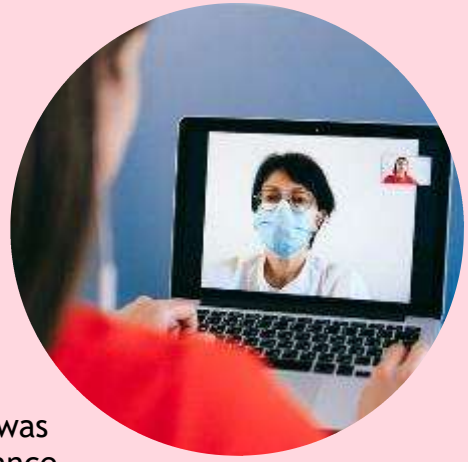
Little information is available about the cardiovascular workforce outside hospital. Research emphasises the importance of streamlined and integrated care for people with heart and circulatory conditions, and the valuable role that general practices, community pharmacists, community rehabilitation specialists, psychologists and dieticians play in prevention and follow-up care.[69,70,71,72] However it is difficult to identify the number of people providing such care. Staff tend to provide this care as part of a wider role.

Primary care

General practitioners with extended roles (previously known as GPs with special interests) undertake a role that is beyond the scope of standard GP training, in addition to their core primary care practice. These roles require additional training but are not formally accredited. They often take referrals from other GPs, including in diabetes and heart disease. We did not identify a record of the number of GPs with extended roles relevant to cardiovascular care across the UK.

In general practice overall, as of December 2021 there were around 52,000 **GPs** licensed in the UK, though not all of them may be working in the NHS.[73] Numbers fluctuate, but the number of GPs in the workforce has not increased as planned.[74] Four out of ten GPs with a full-time permanent contract are men aged 50 or over (43%). Women are more likely than men to hold both locum and GP contracts (66% versus 34% men).[75]

Workforce issues identified in primary care include reducing morale amongst GPs and their teams, increasing workload, retirement and staff nearing retirement age, newly qualified GPs wanting portfolio roles or working as locums, more women in general practice working less than full-time due to family priorities, and decreasing per capita funding in real terms.[76]



In England, in 2021 there were around 23,000 **general practice nurses** working In primary care, with a full-time equivalent of about 15,800. 56% were over the age of 50 years.[77]

Research found that high levels of practice nurse staffing (fewer patients per full-time equivalent practice nurse) was associated with better practice performance in half of the clinical domains of the Quality and Outcomes Framework, including coronary heart disease, diabetes and high blood pressure. High practice nurse staffing was also associated with some improved clinical outcome indicators including blood sugar control in diabetes and cholesterol control overall and for people who had a stroke.[78]

Practice based and community pharmacists also support people with cardiovascular disease. There are around 12,000 community pharmacies across the UK, with about 72,000 pharmacists as of late 2021.[79] Researchers from the UK reviewed studies of pharmacy-led medication therapy and disease management services within primary care, excluding community pharmacy settings. 52 studies from the UK and elsewhere were included. Four out of 10 services studied involved cardiovascular care. Pharmacy-led support may be increasingly common, but we have little data about how many and what type of pharmacy team members provide this support in the UK.[80]

Laypeople have been trained to provide education and support to people at risk of or diagnosed with cardiovascular diseases. Examples include patient educators leading groups and lay health educators providing one to one support.[81] The total number of laypeople trained or currently providing support in the UK is uncertain.

Specialist nurses

Many studies and reviews have highlighted the benefits of cardiovascular specialist nurses, such as diabetes nurses and heart failure nurses.[82,83] Some specialist nurses work in hospital settings and some in the community. Those working in the community are usually employed by community trusts so are included in the figures in Tables 2 and 3 for England. NHS workforce statistics suggest there are around 10,000 nurses of various types working in cardiovascular medicine in England. We do not have a clear idea how many of those work on wards, how many work in the community, or which are specialist nurses versus other types of nurses. The number UK-wide is also uncertain.

As an example, most English clinical commissioning groups and Scottish and Welsh health boards commission community specialist nurses, such as those for heart failure. Heart failure specialist nurses are required to follow up patients within two weeks of hospital discharge, in line with NICE guidance, but most trusts and health boards do not have enough staff in post to achieve this. A survey with commissioners acknowledged that these nurses had 'unmanageable caseloads'. [84] Most clinical commissioning groups are employing one heart failure nurse per 100,000 population, which is not in line with new workforce need predictions.[85] Across Scotland, heart failure specialist nurses and other specialist nurses are also reportedly struggling to manage the additional demands of an ageing population.[86]

Rehabilitation, exercise and diet specialists

We searched for information about rehabilitation specialists, dieticians and psychologists specialising in cardiovascular care in the community. Apart from the general information about staff at trusts in England presented in the last section, we did not identify robust information about workforce numbers or characteristics. This is partly because workers undertake cardiovascular care as part of their roles, not their sole role.

The NHS Long Term Plan advocates exercise as a key component of clinical services, including rehabilitation and follow up care for people with cardiovascular disease. Stakeholders we spoke with said that there is no clearly defined workforce to deliver the Plan.

A review of current UK clinical exercise services covered 216 cardiovascular and 129 stroke services, amongst others. Cardiac rehabilitation services provided clinical and community exercise interventions delivered by physiotherapists, exercise physiologists (degree trained) and exercise instructors (vocationally qualified). Stroke services provided solely clinical exercise interventions, mostly by physiotherapists and occupational therapists. The reviewers stated that clinical exercise job titles, roles and qualifications were inconsistent and not regulated.[87]

Comprehensive cardiac rehabilitation can improve people's quality of life and decrease negative outcomes. But only a small proportion of eligible patients have cardiac rehabilitation. A systematic review of seven studies found that there were both staff and system-level barriers to cardiac rehabilitation for people with heart failure. This included a lack of staff knowledge and poor attitude towards rehabilitation.[88]

Why

This section summarises factors that may be influencing the number and type of workers available to support people with cardiovascular disease

This section is based on feedback from the 62 people we interviewed as well as published studies about factors influencing UK workforce trends. The factors most commonly suggested as influencing the numbers and characteristics of the cardiovascular workforce in the UK were:[89]

Influencing incoming numbers:

- **training** numbers, caps and different training approaches
- reliance on **international recruitment**
- policy focus on **new roles** and new ways of working

Influencing outgoing numbers:

- **ageing workforce**, with many approaching retirement age
- staff **moving** out of the UK to work
- job stress and pressure, exacerbated by the COVID-19 pandemic, which impacts on quality of life and **wellbeing**
- **financial** constraints influencing hiring, education and continued working (including pension impacts)

The themes were consistent across stakeholders from all four countries in the UK. Examples are provided to illustrate points, but the section is not exhaustive. We provided examples of how these factors affect specific roles in the previous section.

Getting staff

Too few people trained

The demand for cardiovascular care continues to rise. This is partly due to a growing and ageing population and to advances in medicine and technology. The stakeholders we interviewed were united in stating that more emphasis and investment in training was needed in every country in the UK. They felt that too few staff were being trained to keep up with demands, particularly echocardiographers and nurses.[90,91]

For instance, numerous analyses have highlighted the need to significantly increase the numbers of cardiac physiology staff to meet current and future demand, particularly in echocardiography.[92,93,94] One analysis found that 78% of departments offering physiological sciences services had difficulty recruiting qualified staff and that 8% of qualified staff posts were vacant.[95,96] Most departments offer training, but there may be limited awareness and uptake. Other barriers include limited training places offered by HEE within accredited programmes and difficulty placing people within departments for training. Furthermore, not everyone who completes accredited training goes on to work in an NHS role. There are losses to locum agencies, overseas employment and the private sector.

Thinking about training more generally, stakeholders felt strongly that shifting training numbers from one specialty to another or focusing on new support roles would simply move the issue to another area rather than addressing underlying funding and development issues.[97]

More people want to train in cardiovascular medicine than are accepted into training programmes with capped numbers. For instance, there is competition for cardiology training posts. In 2018, there were 358 applications for 140 cardiology registrar posts in the UK. This is an average of 2.58 applications for each post, which is higher than many other specialties.[98]

Training place numbers are kept capped so supply does not outstrip demand, and because services do not have capacity to provide placements and supervision. It is difficult to plan how many people to train due to changes in technologies and service demands, variations in posts in different regions and the time it takes to become fully trained. For example, it currently takes at least eight years after professional registration for doctors to become a consultant in the NHS, and a lot can change in terms of service demands within that period.

Most representatives from professional societies and Royal Colleges said they could predict the number of posts in their field needed to serve a local population. This would allow mapping against the current workforce. For instance, the British Association of Stroke Physicians estimated that a hospital serving a population of 350,000 and admitting about 600 acute stroke patients per year would require about three consultants with a sub-specialty stroke interest. Additional service requirements such as rapid access TIA clinics and atrial fibrillation management would require an additional two consultants plus rehabilitation expertise.[99]

Stakeholders from workforce planning teams or with national or regional responsibility for education said they had considered ways to increase staff numbers though increasing the number of training places in existing programmes, apprentice models, focusing on career progression to support retention and advanced/accredited specialist roles.[100,101]

The stakeholders we spoke with emphasised that training and development should be considered a continual process, encompassing initial training, continuing professional education, personal development planning and management development.

Changes in training approaches and governance

The people we interviewed thought that workforce planning for cardiovascular services should be integrated with service planning, liaising closely with education and training bodies. Stakeholders felt that workforce planning was somewhat separate from service planning at present, and that this led to mismatches and shortages.[102]

There have been changes in training approaches for a number of professions. For instance, cardiothoracic surgery trainees moved from local to national selection in 2007. Until 2013, trainees were selected for entry into specialised training in cardiothoracic surgery only after completing core training in surgery. Since 2013, trainees have been able to do all eight years in targeted specialty training. Applications for these posts are more competitive than many other hospital-based specialties, with nine applicants for every available ST1 post.[103]

Some stakeholders believed that these types of changes influenced the accessibility of specialist training and the extent to which trainees were motivated to pick cardiovascular medicine as a career choice.

A lack of general medicine doctors to look after patients on wards means that cardiologists in training now need to train in general medicine. Stakeholders felt that this diluted their expertise and was a threat to the workforce if job roles in the NHS are less attractive than elsewhere.

Challenging experiences during training

The quality and experience of training may affect whether people complete training. For instance, research suggests that a higher than average proportion of trainees experience bullying during cardiovascular training. A survey of foundation-level doctors and core medical trainees found that 24% had experienced bullying during a cardiology training post.[104]

In comparison, a General Medical Council survey of training in 2018, not specific to cardiovascular medicine, found that one in 20 junior doctors in training (6%) experienced bullying in the workplace.[105]

A 2020 study in Wales explored why higher specialty trainees in other specialties had not chosen cardiology as their career. Of 227 trainees surveyed, 49% had completed a cardiology placement previously. The most common reasons trainees gave for not choosing to specialise in cardiovascular medicine were poor work/life balance (40%), competitiveness (17%) and perceived negative attitudes of cardiologists and registrars (17%). Two thirds of those surveyed felt cardiologists and registrars were unapproachable (62%). Female trainees were more likely to say they had witnessed (24%) or experienced (13%) sexism during their cardiology placements than males (14% witnessed, 0% experienced).[106]

Financial constraints on hiring

A strong theme from the stakeholders we spoke with working in frontline or managerial positions in the NHS was that organisations were not hiring the staff needed due to financial constraints.[107] This is not necessarily reflected in vacancy figures, because these show whether posts have been filled, not whether extra posts are needed but not being developed and advertised.

The people we spoke with said that their services did not have the number or type of staff needed to cope with the workload, but that their organisations did not have the funds to seek further staff.

When organisations did advertise for posts, stakeholders said that around one in ten posts took a long time to fill. Figures from surveys and analyses by professional societies and Royal Colleges reinforce that perception.

International recruitment

The NHS has relied heavily on international recruitment across cardiovascular medicine and other specialities. In the NHS as a whole about 15% (one in seven) people working in hospital and community trusts have a nationality other than British. International medical graduates make up around one third of all doctors in the NHS.[108]

International graduates often move to the UK in search of advanced training, higher pay and work experience in an established health system. The supply of internationally trained staff fluctuates over time. Recruitment drives took place after the Francis Inquiry and safe staffing guidelines and as a result of the COVID-19 pandemic.[109] However, stakeholders we interviewed expressed ethical concerns over recruiting the best talent from other countries. They also said that Brexit had influenced some workers to leave the UK.

Immigration policies are now more restrictive. For instance, skilled workers such as nurses who trained in the EU are now subject to the same application process to work in the UK as those who trained outside the EU. This affects the fees they pay and the tests they need to take to register to work in the UK.

The number of newly registered nurses from the European Economic Area (EEA) reduced from 9,389 in 2016 to 913 in 2020. More nurses joined the register from outside the EEA during this period. In contrast, the number of newly registered EEA doctors increased from 1,981 in 2016 to 2,268 in 2020. The number of non-EEA doctors joining the UK register tripled during the same period, from 3,148 to 10,445. These figures relate to all nurses and doctors, not solely the cardiovascular workforce. But data for cardiologists shows similar trends in falling numbers of international recruits for nurses and rising numbers for doctors.[110,111]

Keeping staff

Factors affecting retention

The stakeholders we spoke with suggested that many factors are affecting retention of the cardiovascular workforce, particularly:[112]

- burnout and perceived poor/unsupportive culture in the NHS (including expectations and the extent to which staff felt valued)
- lack of clear progression pathways in some specialities
- retention bonuses and higher salaries in London, which can draw staff from other areas
- more opportunities or higher rates of pay in the private sector and internationally

The perceived factors were similar between different professions, and mirror trends from other specialities and past surveys.[113,114]

For example, a systematic review of 18 studies explored factors influencing retention in emergency medicine (some of which included cardiovascular care). The reviewers were from the UK but studies were not solely from the UK. Factors that affected retention included perceptions of teamwork; workload; working conditions; antisocial working patterns; physical and emotional strain; stress; burnout; income; work/life balance and opportunities for teaching, education, progression and portfolio careers. Few studies explored initiatives to improve retention.[115]

A survey of registered nurses and healthcare assistants working in cardiology, emergency care and paediatrics explored whether team working, continuing professional development and autonomy influenced satisfaction and retention. The study was in a part of England with one of the highest nursing vacancy rates in the country. Nursing staff were generally satisfied with team working and continuing professional development, but many were dissatisfied with their ability to carry out duties as they saw fit. The researchers suggested that autonomy may be a key enabler or hinderance in retention.[116]

Other UK surveys with nurses, including those providing cardiovascular care, found that a perceived lack of opportunities to advance was a barrier to retention.[117]

Moving to another country

As we described in the previous section, a significant number of cardiovascular consultants have left the NHS to work in other countries or the private sector. The stakeholders we interviewed and published literature emphasised that workers do not feel valued, are overworked, find it difficult to gain work/life balance and are frustrated by a lack of development opportunities, financial pressures and perceived fragmentation and change of structures.[118]

There is much similar research suggesting that these issues are not specific to the cardiovascular workforce.

Surveys with UK medical graduates, not specific to cardiovascular care, supported this. Doctors were surveyed three years after graduating. Half were thinking about working in medicine outside the UK and 10% were considering leaving medicine. Among those considering working in medicine outside the UK, the main reasons were negative views of the NHS and its culture; and opportunities for more experience, pay and better conditions elsewhere. The survey was repeated over time. More recently, even greater numbers were likely to cite NHS culture, policies and conditions and work/life balance as reasons for considering leaving the NHS. [119]

Surveys suggested that four in ten doctors trained in the European Union were considering leaving their NHS roles as the UK prepared to leave the EU.[120]

Maturing workforce

The previous section showed that a significant proportion of the cardiovascular workforce is nearing retirement age. This includes general practitioners and general practice nurses, cardiologists, surgeons and cardiovascular nurses. Around one quarter to one third of the workforce are aged 55 or older.

As an example, a 2019 analysis found that 36 surgeons working in six UK centres did cardiopulmonary transplantation, but more than half are aged 50 or over.[121] The number of people having cardiopulmonary transplantation has increased and demand is likely to increase further due to law changes, donor increases and technological advances. But half the surgeon workforce will likely retire within the next ten years.

Stakeholders we spoke with said that some initiatives were assisting the cardiovascular workforce to stay working for longer. They mentioned retention bonuses; physical changes such as seats and magnifying equipment in theatres; part-time work and portfolio roles with more teaching, research and development. However they emphasised that some cardiovascular specialities and roles are physically as well as mentally demanding. The older people get, the more difficult they may find it to continue their roles due to changes in physical dexterity and eyesight, for instance. So changes to the working environment and working patterns can only do so much.[122]

There may also be disincentives for senior workers to continue working or extending hours. A survey of anaesthetist consultants, not specific to cardiovascular work, found that 14% (1,133) had reduced their programmed activities as a result of pension tax changes. The proportion of consultants reducing their work ranged from 4% in London to 19% in Scotland.[123]

Some stakeholders we spoke with concurred that this was a significant issue in cardiovascular care. They said that punitive pension taxes mean senior staff are not able to do extra work without losing money. This affects the extent to which they are willing to fill gaps or do overtime. This may be a significant issue in interventional cardiology for example, where many consultants are in their fifties so are impacted by pension tax.

Gender

The previous section showed that there are more male than female cardiologists, cardiothoracic surgeons and radiologists.[124] For instance, only around 15% consultant cardiologists in the UK are women.

Surveys identified that both cardiologists and trainees perceived gender biases and bullying within cardiovascular medicine that may impact on recruitment and retention.[125]

A 2018 survey concluded that female cardiologists in the UK experience more sexism and sexual harassment than male cardiologists. 174 consultant cardiologists answered a survey (24% female, 76% male). 62% of female cardiologists said they had experienced discrimination of any type compared with 20% of male cardiologists. Women mainly reported discrimination based on gender and parenting. 36% of female cardiologists said they had experienced unwanted sexual comments or attention from a senior person or colleague, compared with 6% of male cardiologists. Women were more likely to say that sexual harassment affected their professional confidence (43% compared to 3% of men). One third of female cardiologists thought that sexism affected their opportunities for professional advancement (33% compared to 2% male).[126]

The British Junior Cardiologists' Association surveyed 1,358 trainees between 2017 and 2020. 11% said they had experienced bullying in cardiology departments, mostly from consultants in cardiology and other specialities. One third of trainees said they had experienced at least one inappropriate behaviour (33%), such as being shouted at (8%). Women and people who had graduated from medical school outside the UK were more likely to say they had been bullied. They were also more likely to say they had experienced sexist or racist language.[127]

Similar issues have been identified in cardiovascular radiology.[128]

Stakeholders said that some women wish to work flexibility or take career breaks to prioritise family responsibilities. This, coupled with antisocial work patterns in cardiovascular medicine, may continue to hinder gender diversity in the medical cardiovascular workforce. This may also impact the numbers of women working in cardiovascular nursing and allied health professional roles.

A 2013 analysis reported that cardiology is one of the most popular hospital medical specialties in the UK. It is highly competitive in terms of the number of higher specialty training posts available. The researchers examined doctors' intentions about seeking careers in cardiology. They surveyed UK medical graduates in selected qualification years between 1974 and 2009 and followed them up 1, 3, 5, 7 and 10 years after graduation. Men were consistently more likely to have cardiology as their first choice than women. The proportion of doctors who had cardiology as their first choice of career declined between one and five years after qualifying. The decrease was most marked for women. Doctors said that 'domestic circumstances' were not a key influence on their specialty choice. Experience of the job so far and particular trainers or departments were far more important. Coupled with other survey data, this suggests that more could be done to address the gender imbalance by improving women's experience of cardiology placements.[129]

Working environment and roles

Geographical differences

Stakeholders and research highlighted the impact of the COVID-19 pandemic on workload, backlogs and staff health and wellbeing.[130,131,132,133]But stakeholders were unanimous that a cardiovascular workforce crisis had been building for many years.

Stakeholders from all four countries in the UK highlighted gaps in diagnostic roles, hospital nurses and doctors, therapy teams and primary care teams. They also pointed to high turnover of administrative and support staff.

Stakeholders also reported significant national variations in how and where cardiovascular services are provided across the UK. This may lead to inequalities in patient care, as well as staffing. Reports have suggested disparities between spending, activity and the burden of disease.[134] The cardiovascular workforce is most concentrated in large urban areas in England, not areas with the highest level of death and disability from cardiovascular disease.

Good work in cardiovascular care and workforce planning is happening in Scotland, Northern Ireland and Wales, but differences in clinical practice, healthcare policy and budgets all impact on workforce training, support and retention. In England there are regional differences in staff numbers and vacancies.[135]

Service reorganisation

Stakeholders we spoke with said the way that workload is organised significantly affects the workforce needed. Some gave examples of restructuring or service organisation that was perceived to increase workload, and may reduce retention. Others highlighted the impact of moving to 7-day working on workforce needs.

An example at operational level is a study of the workload in a paediatric cardiac intensive care unit in London. There were 2,799 admissions over a 49-month period. The greatest number of admissions were in the early evening. There were fewer cases overnight, but these were more likely to be complex emergencies. However, the conventional medical staffing roster concentrated most staff in the morning and reduced staffing to the lowest level overnight. The researchers concluded that workload was most intense for the in-house team at night. They suggested that conventional roster patterns were not only problematic for patient care, but may also affect staff wellbeing and retention.[136]

Another example is the staffing available for on-call (emergency) and out of hours work at hospitals. Stakeholders reported that job descriptions for new consultant cardiologist posts sometimes do not include out of hours responsibility and some hospitals do not make consultant cardiologists available during weekends. Services are attempting to adapt to workforce shortages by adjusting rotas. Stakeholders said that this impacts on patient care and staff wellbeing, which may in turn affect retention.

An example at a more structural level is how cardiothoracic surgical services have been reorganised over the past decade. There are now three broad subspecialties (adult cardiac, congenital cardiac and general thoracic surgery and the subspecialty of cardiopulmonary transplantation). Examples of workforce impacts include:[137]

- Trainees and consultants are more likely to specialise rather than covering dual roles. The assumption is that if surgeons and hospitals specialise in certain elements, they will get more experience and thus improve outcomes for patients. However, this also means that the number of surgeons needs to increase to keep pace with demands, standards and service reorganisation. NHS trusts share teams of adult cardiac surgeons between hospitals to do less common operations. Surgeons now need to work in multidisciplinary teams.

- The amount of thoracic surgery has increased in the past ten years, including minimally invasive surgery. The thoracic surgery workforce has grown. Fewer of this workforce will reach retirement age in the next decade compared to other parts of the cardiovascular workforce.

- Congenital surgery services have amalgamated, including services for children and adults. Recent standards require all surgeons to carry out at least 125 operations per year and work in teams of at least four surgeons. This means the number of congenital cardiac surgeons needs to increase.

- Anaesthesia has formally separated from intensive care medicine. Separate certification is needed for each specialty. This makes it harder to attract trainees to cardiothoracic anaesthesia. Half of UK cardiothoracic units have vacancies for consultant anaesthetists.

What next

This section summarises what the people we interviewed and literature said should be prioritised when planning and developing the workforce

This section is based on studies as well as feedback from the 62 people we interviewed. It includes stakeholder opinions about the key priorities when planning and developing the cardiovascular workforce.

The representatives from national workforce and education teams, professional societies and Royal Colleges that we spoke with were all aware of and wanted to prioritise the cardiovascular workforce crisis.

Stakeholders said that short term solutions were needed to address workforce shortages, service backlogs and wellbeing issues from the COVID-19 pandemic. Longer term planning and development is also needed.

There is already much work underway. For example, the Heart Disease Action Plan in Scotland includes workforce gap analysis, training pathways for healthcare scientists, developing a competency framework for specialist roles and supporting advanced practice training.[138] In England, the Cardiac Pathway Improvement Programme is analysing workforce roles and training opportunities, and has developed a toolkit signposting to available resources.[139]

The priorities for cardiovascular workforce planning and development that stakeholders mentioned most often were:[140]

- taking a **holistic view** of the workforce rather than defining it based on hospital specialities
- robust integrated processes for collecting and compiling **information about the workforce** to help calculate workforce needs
- addressing burnout and wellbeing to make the best use of **existing staff resources**
- testing **ways to retain existing staff**, including adaptations to working patterns and roles and opportunities for career progression
- **training** more professionals in key areas, and considering ways to adapt training requirements to fast track numbers whilst maintaining quality and safety

Planning holistically

Defining the workforce

For our rapid scan, we focused on healthcare professionals whose main role is supporting people with cardiovascular disease. We did this to stay consistent with the definition of the cardiovascular workforce used by the Scottish Government in their 2021 Heart Disease Action Plan and accompanying work.[141,142]

In our forthcoming census of key roles, we are focusing on an even more targeted number of core roles. This is also in line with plans for a census of key cardiovascular workforce roles in Scotland.

Whilst these definitions serve a practical purpose, a recurring theme from research and stakeholder interviews was the importance of recognising the wide range of workers who support people with heart and circulatory conditions, whether as their main role or not.

People with heart and circulatory diseases need support from multidisciplinary teams. Stakeholders suggested that the core cardiovascular multidisciplinary team should include consultant cardiovascular-related doctors, non-consultant hospital doctors, clinical nurse specialists, diagnostic staff, laboratory staff and administrative and technical support staff such as a database manager and audit and research staff. They said there should also be access to speech and language therapists, physiotherapists, occupational therapists, dieticians, pharmacists, psychologists and social workers as needed. Stakeholders thought that each team should have a community liaison coordinator and work closely with primary care teams. They said that it was essential to *consider workforce planning for all of these roles in an integrated manner, rather than focusing in isolation on certain posts*.[143]

Taking a wider view of the workforce would also include prevention and public health teams.[144] Stakeholders said that focusing on the specialist workforce may overlook that appropriate staff are needed for triage and risk stratification of patients. They said that prevention and low level care was just as important for cardiovascular disease as more specialist care.

Some stakeholders said that there had been a reducing focus on cardiovascular disease in general practice in England up until the NHS Long Term Plan. Practices focused on the Quality and Outcomes Framework (QOF) as that is how general practices are incentivised. Although QOF includes some cardiovascular indicators, some believed that the general practice workforce had been deskilled in cardiovascular prevention, diagnosis and care. Training and resourcing would be needed to redress this.

These stakeholders said that a wide range of professionals in primary care should have cardiovascular care in their roles. This includes healthcare assistants, practice nurses, clinical pharmacists, social prescribers, GPs and receptionists. Restructuring into integrated care systems and primary care networks in England provides opportunities, because each network has a contracted cardiovascular lead as part of direct enhanced service contracts.

Stakeholders felt that the workforce should not be defined exclusively in terms of frontline staff. Rather public health teams, academic health science networks, training hubs, primary care networks, integrated care systems and others all need to be considered and educated to support cardiovascular care.[145]

Another area that stakeholders felt should be prioritised for workforce planning and development was social care and the voluntary sector workforce, and unpaid carers and patients themselves.[146]

Social care is often overlooked in workforce planning, but it is essential for supporting people with heart and circulatory conditions.

There are around 1.1 million full-time equivalent staff in social care in the UK, which is almost the same as working in the NHS. Most social care workers are not professionally regulated (95%), though there are around 42,000 registered nurses working in adult social care in England, largely in nursing homes. There are also several thousand regulated therapists, social workers and allied health professionals, many of whom support people with cardiovascular disease.[147]

Social care organisations are often small. Of the 21,200 social care providers in England, around half employ just one to four staff. Only 6% employ more than 100 staff. More than three-quarters of roles are in the private or voluntary sectors.

Social care has a growing issue with recruitment and retention, exacerbated by poor pay and conditions. Skills for Care suggests that vacancy rates for social workers in England increased from 8% in 2012/13 to 11% in 2016/17. These issues have been compounded by the UK's departure from the EU. It is estimated that the sector needs to find an additional 650,000 staff by 2035.[148]

Compiling information

Stakeholders we spoke with felt strongly that there was a lack of accessible information about the cardiovascular workforce and no integrated approach to track changes and needs over time. Individual professional societies and Royal Colleges sometimes had good data about their own workforce specialty. But they and workforce planners in the four UK countries did not think this was drawn together and analysed to support policy and practice across the UK or in regions.[149]

They welcomed our plans for a census of key roles in acute settings and would like to see this extended and embedded as part of usual practice. Some professional societies and Royal Colleges wanted workforce reporting to be mandated every two to three years to support workforce planning.

There is already information available about some parts of the NHS workforce, particularly those employed by hospital and community trusts in England. However the datasets publicly available do not allow breaking down of much information specific to the cardiovascular workforce. For example, we know the proportion of staff overall who say they are planning to leave their roles, but we do not know the proportion for those supporting people with cardiovascular disease, or breakdowns of frontline versus other staff.

Stakeholders said it was important to have agreed ways to measure progress in workforce planning and development. This includes realistic indicators which focus on skill mix and wellbeing, not solely workforce numbers and retention. Some work has been done to consider ways to measure the outcomes of nurse-led and pharmacist services (whether focused on cardiovascular care or not),[150] but there has been less consideration of how to define what an appropriate workforce looks like and how to measure the extent to which this is in place.

Another priority may be to explore the costs and benefits of various roles. Stakeholders said that having data about the savings generated by boosting numbers or creating new roles would help to generate business cases to justify hiring staff. They said that they did not have information about the impact of workforce numbers, roles or skill mix on reducing the use of locums, bank or agency staff, for instance.

Planning and gap analysis

Stakeholders said that there had been a lack of workforce planning for several decades. They particularly highlighted gaps in planning for healthcare scientists, nursing and cardiologist registrars.

The felt that it should be a particular priority to address gaps in the number of echocardiographers, advanced nurse practitioners, surgical care practitioners and cardiologists and surgeons. They said that healthcare scientist and advanced practitioner roles should be registered and regulated by a professional body.[151]

NHS workforce teams in all four countries of the UK were undertaking work to plan workforce numbers needed in future, however stakeholders felt that these types of gap analysis sometimes focused only on some specialities and underestimated the numbers needed.

Stakeholders suggested that gap analysis should consider trends in flexible working, career breaks and approaches to build a workforce more inclusive of diverse demographics. Stakeholders emphasised that many staff work part time, so workforce planning needs to look at full-time equivalents.

Some suggested that localised workforce planning could usefully be done at network level. In other words, exploring the number of staff needed across an integrated care system or locality rather than for individual hospitals.

This approach could also be applied to having contracts with locum agencies across integrated care systems. Stakeholders felt that Payment by Results had disincentivised working collaboratively because the more patients a hospital saw, the more they were reimbursed.

Opportunities to innovate

Training

Training new staff requires significant financial investment and is not a quick fix for staff shortages. Training a hospital consultant typically costs more than £500,000 and takes 14 years.[152] Various studies and reviews have explored ways to improve the training of professionals to support cardiovascular care.[153,154] England's Cardiac Pathway Improvement Programme has summarised training resources for the workforce (see Box 2 for examples).

The stakeholders we spoke with felt that doing 'more of the same' in terms of workforce training, roles and ways of working was not the best way to sustain services and meet changing needs. People acknowledged the urgent need to train and recruit more staff into the workforce, but they thought it was a priority to consider innovative approaches rather than solely increasing training places.

Stakeholders said that there is a great deal of pressure on teams to address inpatient and outpatient backlogs so they do not have time to offer more placements and training. They emphasised that planning needs to consider the capacity of existing teams to devote to training and supervision. They suggested that campaigning for more training and more staff missed a key priority: having a planned approach to embedding, welcoming and retaining people in the workforce.[155]

In terms of building training capacity to support new trainees, stakeholders suggested:

- group supervision and training sessions
- incentivising supervisors to train people, with ringfenced time for supervisor's own development or financial bonuses
- building career pathways such as band 8 training posts
- more online training courses

Box 2: Examples of training resources and roles summarised by England's Cardiac Pathway Improvement Programme

Health Education England is facilitating a range of training opportunities for the **echocardiography** workforce. These include:

- Higher Specialist Scientist Training, a five-year workplace-based training programme that results in a doctorate and allows people to apply for clinical consultant posts (see https://nshcs.hee.nhs.uk/programmes/hsst/)
- 60 cardiac places on the Scientific Training Programme. About half of cardiac places choose to specialise in echocardiography. The three year training qualifies workers as clinical scientists (see https://nshcs.hee.nhs.uk/programmes/stp/)
- The Echocardiography Training Programme is 18 months, combining academic and work-based learning. Currently there are around 60 places per year, with plans to extend to over 100 (see https://nshcs.hee.nhs.uk/programmes/etp/about-the-echocardiography-training-programme/)

There are various training programmes to support surgical and other care roles, including:

- Advanced critical care practitioners (https://www.healthcareers.nhs.uk/explore-roles/medical-associate-professions/roles-medical-associate-professions/advanced-critical-care-practitioner)
- Surgical care practitioners (https://www.rcseng.ac.uk/education-and-exams/accreditation/surgical-care-practitioner/)
- Anaesthesia associates (https://www.rcoa.ac.uk/training-careers/working-anaesthesia/anaesthesia-associates)
- Physical associates (https://www.fparcp.co.uk/about-fpa/overview)
- Operating department practitioners (https://www.healthcareers.nhs.uk/explore-roles/allied-health-professionals/roles-allied-health-professions/operating-department-practitioner/entry-requirements-and-training-operating)
- Surgical first assistants (https://www.rcseng.ac.uk/careers-in-surgery/surgical-care-team-hub/surgical-care-team-roles/surgical-first-assistant/)

Advanced clinical practitioner roles are developing in a range of specialities, including cardiovascular care. They have additional responsibilities such as leadership and research. Roles can be filled by nurses, allied health professionals and pharmacists who undertake extra training at Masters level. Health Education England has training and funding packages (see https://advanced-practice.hee.nhs.uk/)

Enhanced clinical practitioners work across settings as part of multidisciplinary teams. These are extended roles rather than advanced roles. Training is via apprenticeship, usually for about 18 months (see https://www.instituteforapprenticeships.org/apprenticeship-standards/enhanced-clinicalpractitioner)

Improving the size and efficiency of the training pipeline would need to be backed by appropriate levels of funding for education and placements and better co-ordination between the many parties involved.

Another priority was to draw together learning from and potentially standardise competency frameworks for specific roles. Various competency frameworks and continuing professional development programmes are available. For instance the European Society of Cardiology and the Council on Cardiovascular Nursing and Allied Professions developed a core curriculum to inform the education of nurses following initial qualification for work in cardiovascular settings. This has been applied in some UK centres and elsewhere.[156] There are many such frameworks available for new or expanded roles. A gap is understanding what is available, for whom and what the impacts and gaps may be. The NHS in Scotland is reviewing and compiling some of these competency frameworks.

Focusing on reducing attrition during training could also have significant benefits. Training attrition levels are high across many professions. This is not only an issue in cardiovascular care. For example one in four potential consultants stop training before reaching a senior doctor role. One in four UK students who begin three-year nursing degrees also left or suspended their studies.[157]

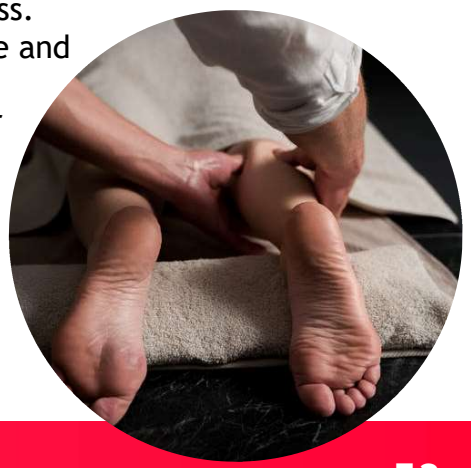
Other stakeholders emphasised the importance of thinking about training in terms of continuing professional development of the existing workforce, not solely new recruits. They said that there was much work to do to help people understand when to refer to various departments and to triage so patients were seen by the right staff at the right time. For instance, the British Echocardiography Society has developed materials to help GPs decide who should be referred for scans.[158.159]

Retaining the workforce

Stakeholders suggested that it should be a priority to learn how to retain the current workforce and make best use of existing resources. This may include:

- building **compassionate leadership**
- focusing on making the NHS a good place to work, such as through **culture change** and addressing a 'toxic culture'
- addressing workforce health and **wellbeing**, including high rates of burnout and exhaustion
- considering **physical adaptions** and support. For example, many roles involve leaning over, standing or sitting for long periods, so the workforce may have musculoskeletal issues in future
- helping people work more **autonomously** and at the peak of their scope of practice
- making sure that staff have the **equipment** and resources needed to fulfil their roles, such as adequate scanning equipment
- reducing **competition for staff** between local providers and competitive band inflation which can act as a barrier to staff retention.[160]

Retention is largely a result of people's experience of work. People leave because they feel overworked, undervalued, underpaid, poorly treated and unable to progress. These are all part of the NHS culture and working environment. These issues are not unique to the cardiovascular workforce, but stakeholders felt they were key to address as part of workforce planning.



Leadership is the single most powerful and changeable influence on the culture of the NHS. Culture shapes how people deliver care, manage their work and interact with patients and colleagues. Some commentators suggest that the NHS should do more to become a good employer, and that this would have significant impacts on retention.[161]

The NHS staff survey results described earlier highlighted concerns about ways of working and morale. Stakeholders said that staff mental health and wellbeing is an increasing issue. Small things can become a focus of discontent and impact on retention intentions. These include having space for a break and staff parking.

This is backed up by published research. Reviewers from the UK compiled information from 24 studies about the impact of working through the COVID-19 pandemic on healthcare professionals. Most studies were from outside the UK and focused on urban hospitals. The research was not specific to cardiovascular care. However the studies consistently showed that working through the pandemic had had a significant impact on the mental health of the workforce. Nurses were at higher risk of poor mental health outcomes. The studies found that systematic support was needed to protect the workforce.[162]

Some stakeholders described examples of leadership, mentoring, coaching or resilience initiatives that their organisations had found worked well.[163] They suggested that more could be done to share evidence-based initiatives to address workforce health and wellbeing.

Inclusion

Another priority area for stakeholders was understanding ways to encourage more diversity and inclusion in the workforce.

Stakeholders suggested that cardiovascular doctor, nurse and healthcare scientist careers should be more family-friendly, with reduced hours, less unscheduled care and more scope for part-time working.[164]

In the NHS more generally, more than a quarter of staff from minority groups do not believe that their organisation provides equal opportunities for career progression or promotion. There also remain disparities in pay in the form of a gender pay gap. It is likely that these general trends are also evident in the cardiovascular workforce.

A generational shift is occurring in the cardiovascular workforce. Younger and older workers may have different needs and expectations, so singular approaches are unlikely to support widespread retention. Less senior staff may need clearer progression pathways. Staff towards the later stages of their career may prefer more flexible working than current hospital cardiovascular rotas support. There are also unresolved issues regarding pensions policy.

The stakeholders we spoke with said they knew there were gender and ethnic disparities across many specialities, but they did not know what to do to address them.

Some representatives said that their organisations did not currently collect or look at data about the demographic characteristics of members. Stakeholders acknowledged diversity and inclusion as important, but said that this was currently less prioritised for action as the focus was on boosting overall numbers.

Extending roles

Stakeholders emphasised that changes to training, roles and ways of working were impacting on subsections of the cardiovascular workforce.

In England the NHS Long Term Plan and the People Plan set out aims related to improving the working lives of staff and increasing numbers of medical students, nurses, midwives and GPs. There was little focus on addressing shortages in hospital specialists.[165,166]

Traditionally, consultants have led a team of more junior medically qualified staff. That model is no longer sustainable in some fields so new professional roles have emerged, including advanced nurse practitioners, physician assistants and specialist nurses providing follow-up in the community. These non-medically qualified staff are now a key part of multidisciplinary cardiovascular teams, and assist with training cardiothoracic surgical trainees and cardiovascular consultants. In hospital and in the community there are examples of clinics led by specialist nurses, pharmacists and healthcare scientists.[167]

It is common to recommend looking at changing skill mix and ways to do things differently so that lower grade staff release specialists' time to concentrate on clinical care. However, it is unclear exactly how to do this in a practical sense. The outcomes are also mixed. For example, research about different roles and skill mix in heart failure care in England and Scotland identified both positive and negative impacts.[168] So did studies of task-shifting of care for people with high blood pressure to non-medical health workers in the UK and elsewhere.[169]

Furthermore, recruitment into advanced practitioner roles usually comes from overstretched professions such as nursing. Taking skilled, experienced staff from an already depleted workforce may simply move the issues from one profession to another.[170]

Stakeholders we spoke with cautioned that it took time to build acceptance of new roles and for people to provide care at the highest level of their scope of practice. Whist competency frameworks and job descriptions exist, some roles have wide differences in definition and task functions. Advance nurse practitioners are an example. It also takes time to recruit, train and embed individual workers. Whilst new roles were welcomed, stakeholders generally did not feel they should be relied on as the only solution to workforce challenges.[171] People felt that more could be done to use new roles to the fullest extent, to free other staff to do tasks that only they can achieve.

Stakeholders said it was a priority to explore whether different roles could expand their scope of practice, such as physician assistants doing a limited echocardiography scan or sonographers running community clinics. They emphasised that there is no need for all tasks to be led by doctors and nurses. They said that the available workforce needed to be used more flexibly.

Stakeholders thought that community and primary care practice-based pharmacists were a largely untapped resource in the UK. Pharmacists have a role in prevention as well as follow up-care, but studies suggest that barriers include reimbursement, lack of private facilities and lack of awareness or confidence in these roles.[172,173,174]

Another priority stakeholders identified was to help patients and carers be valued as members of the unpaid workforce. Stakeholders suggested that there was room to better educate people to manage their conditions and risk. This could include home blood pressure monitoring with data automatically transferred to professionals for review, for example. These types of initiatives all impact on the workforce needed and ways of working.

New ways of working

Stakeholders said that silo working was a key barrier in cardiovascular care.[175] They said it should be a priority to break down divisions between organisations, sectors and specialities. Providing care in a more holistic way has implications for the number and type of workers needed, as well as the skills they need. For instance, the workforce could work across multiple organisations within a network or integrated care system to staff clinics and on-call rotas.[176]

Stakeholders said that part of using the existing workforce to the best effect was considering how services were organised. Some said that prevention, diagnosis and low level care management is key, They suggested that teams could work more efficiently. For example if someone is checked for diabetes in primary care, they could also be checked for heart failure. Having an extended appointment to check for a variety of long term conditions at once would be more joined up for patients and use staff time more efficiently.

Another way to tackle workforce issues is to make better use of technology. Digital technology and connectivity across healthcare is not ideal. Secondary care records do not automatically show on primary care systems. Digital innovations could help support better care and help the workforce be more efficient.

One of the potential positive outcomes from the COVID-19 pandemic is rapid adoption of technology into standard practice.[177] Many organisations planned to expand their use of digital care and telemedicine, including virtual consultations. The pandemic accelerated this. An example is at-home blood pressure monitoring. Since October 2020, over 22,000 people in England received blood pressure monitors to record their blood pressure and send their readings to primary care teams to review by telephone, email or via a remote monitoring platform.[178]

Another example is at home cardiac rehabilitation. The proportion of eligible people with heart failure accessing rehabilitation clinics dropped from 10% to 5% during the pandemic. The proportion of people using home-based rehabilitation tripled during the same period, from 22% to 74%. This has necessitated new workforce skills and ways of working.[179]

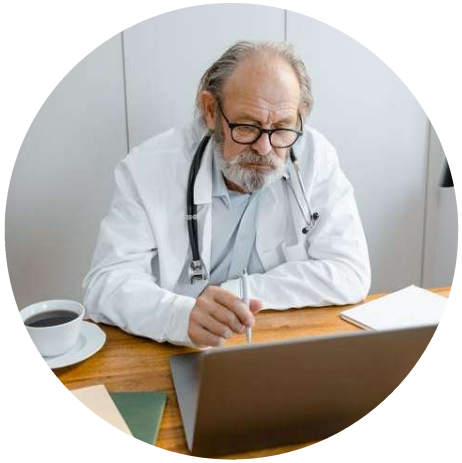
A systematic review of nine studies explored delivering virtual / remote healthcare to people with cardiovascular disease, including during isolation periods during the pandemic. The studies were not solely from the UK. The reviewers found that preparing the workforce and ensuring reimbursement for remote healthcare were key success factors.[180]

A survey of 114 doctors and other healthcare professionals working in NHS trusts, not all in cardiovascular care, found that most had not received training in providing telemedicine consultations prior to using these during the pandemic.[181]

The message was that workforce planning, training and development need to be aligned with new ways of working. Workforce planning should not be considered in isolation, away from service planning and delivery.

What we found

This section summarises key messages and issues with the data



This report is a step in our journey to:

- build a better understanding of what the cardiovascular healthcare workforce looks like
- inform our policy and influencing work to support workforce planning at a national and regional level
- raise awareness of the gaps in workforce data collection
- make the case for greater prioritisation of and investment in the workforce

The NHS Long Term Plan and various policy and research initiatives took steps to prioritise cardiovascular disease. Achieving these plans requires a robust and stable workforce, with sufficient numbers and skills. The COVID-19 pandemic placed more pressure on health and care services, left significant backlogs and exacerbated issues with workforce retention and wellbeing.

Prior to the pandemic, there were gaps identified in the cardiovascular workforce. The legacy of the pandemic means that the workforce may be even more depleted to address future cardiovascular care needs. However it is difficult to quantify the gap between the number and type of workers needed and what is in place or being trained. We did not identify any comprehensive overview of the characteristics of the cardiovascular workforce, either through NHS databases or published and unpublished literature.

The readily available information suggests:

- there is **no clear definition** or consensus about the roles that comprise the cardiovascular workforce
- the NHS is undertaking work in England and Scotland to quantify the workforce and explore priority areas. We should **work closely** with NHS bodies and professional societies to compile data and identify priorities
- the NHS collects a lot of information about the workforce, including retention intentions, wellbeing and diversity and inclusion. Breakdowns of all roles and regions are not publicly available, but there is potential to undertake more **analysis in partnership**
- stakeholders and research identify a significant gap in the number of workers available to support diagnostics and imaging, as well as gaps in advanced nurse practitioner and consultant roles[182]

In terms of workforce numbers and characteristics, as of late 2021/early 2022:

- Across the UK, **over 30,000 FTE** work in hospital and community trust roles focused on cardiovascular care. About 60-70% are doctors and nurses. There is also a large pool of managerial, facilities and support staff, as well as allied health professionals.
- Key workforce numbers in the UK include around 1,300 people providing echocardiograms; 1,700 consultant cardiologists and 850 cardiologists in training; 250 consultant cardiac surgeons; 450 consultant vascular surgeons; 320 cardiothoracic surgical care practitioners; and over 10,000 nurses working in cardiovascular care (all numbers rounded).
- Across the UK as a whole, the numbers of rehabilitation specialists, psychologists, dieticians and GPs with extended roles specialising in cardiovascular care are unknown.
- There are significantly more men in cardiovascular medical and surgical roles than women. Some disincentives and gender bias have been identified.
- There are a high proportion of internationally trained professionals in the cardiovascular workforce, particularly amongst medical and surgical roles.
- One fifth to half of various workforce groups are in their fifties or older, and will likely retire in the next decade. [183]
- In the latest NHS staff survey, 31% of staff said they often thought of leaving their role. Smaller surveys specific to the cardiovascular workforce show similar trends. Enhancing work/life balance and not feeling valued are key drivers for leaving.

Table 8: Headcount of UK cardiovascular workforce

Primary care	Acute hospital care	Community care
• Unknown number of GPs with extended roles in heart conditions	• 1,700 consultant cardiologists, 850 higher specialty trainees • 250 consultant cardiac surgeons, 450 consultant vascular surgeons • 400 consultant cardiac anaesthetists • 10,000+ nurses working in hospital and community trusts including specialist nurses and cardiology ward nurses • 1,300 echocardiographers • Unknown number of advanced clinical practitioners in cardiology, cardiac perfusionists, specialist pharmacists, physician associates working in cardiology, radiographers who specialise in cardiology or cardiac clinical scientists (over 3,300 scientific and technical staff with cardiovascular work area)	• Unknown number of cardiac rehabilitation specialists (nurses, physiotherapists and exercise specialists) • Unknown number of clinical psychologists specialising in heart conditions • Unknown number of dieticians specialising in heart conditions

All of the stakeholders from NHS services, professional societies and voluntary sector organisations that we spoke with said there was a workforce crisis in cardiovascular care. This included shortages in specific roles, a perceived inadequate training pipeline, a high proportion nearing retirement age and significant issues with morale and wellbeing. Staff are working long and sometimes excessive hours, increasing the risks of fatigue, burnout and reduced quality of care.

The characteristics and issues for the cardiovascular workforce are generally similar to the NHS as a whole, to the extent that information is available (see Table 9). Some demographic disparities are more marked, but vacancy rates and wellbeing and morale issues are similar to the wider NHS.[184,185]

The trends were similar across all four countries in the UK.

There are no quick fixes to workforce pressures. The number of trainees needs to increase, but so too does capacity within services to provide training and supervision. The NHS needs to monitor training progress and assess why training schemes have less than 100% fill rates or the reasons for attrition.

Given how long it takes to train new workers, the NHS also needs to retain and value the workforce it has and make best use of existing roles. This includes providing satisfying roles and career progression to encourage people to stay, and addressing culture and leadership. *Stakeholders said it was a priority to understand how to do these things well, including the best ways to support staff, what made roles attractive and flexible and how to address inclusion issues so as to attract and retain a more diverse cardiovascular workforce.*

In fact, stakeholders said that looking at workforce 'gaps' and simply seeking to train more staff or recruit internationally to fill these gaps was not the answer. A higher priority for most was making sure we can retain existing staff by having pathways for progression in place and addressing culture, burnout and morale. Another key priority was exploring how to use the existing workforce in new ways, to the highest extent of their scope of practice.

Also key, according to stakeholders, was including the wider workforce supporting cardiovascular care in workforce planning. This includes primary care, social care and the voluntary sector. Administrative and clerical staff across all sectors were seen as important enablers, who should be accounted for in workforce planning.

When thinking about the workforce, we also need to consider people's involvement in their own self-care and the key role of unpaid carers.

Table 9: Similarities and differences between cardiovascular and wider NHS workforce

Characteristics	Total NHS workforce	Cardiovascular workforce
Age 55+ years	13% of doctors and 18% of nurses and health visitors	30% cardiology consultants 58% cardiac surgery consultants over 50
Gender	46% of doctors and 88% of nurses and health visitors are women	15% cardiology consultants, 3% cardiac surgery consultants, 8% vascular surgery consultants are women
Ethnicity	22% from minority ethnic groups	Unknown
Nationality	16% outside the UK	41% of cardiac surgeons qualified in medicine outside the UK
Role types	Half professionally qualified / registered clinical roles	About two thirds professionally qualified / registered clinically roles
Health and wellbeing	In England staff survey 47% said they had felt unwell as a result of work-related stress in the past 12 months	Unknown
Perceived bullying and harassment	In England staff survey 12% from managers and 19% from other colleagues in past year	Various surveys found 24% of trainees said they experienced bullying during a cardiology placement, 24% of female trainees said they saw or experienced sexism during cardiology placement, 36% of female cardiologists experienced unwanted sexual attention from a colleague
Retention intentions	23% who completed England NHS staff survey intend to leave in next 12 months	34% vascular surgeons plan to retire in next 10 years
Vacancy rates	8% full-time equivalent posts vacant	

Source: numbers are drawn from sections of this report which cite each source

Data issues

When considering the themes from this rapid review, it is important to recognise issues with the data. These include:

- using a narrow definition of the cardiovascular workforce. Many statistics and surveys focus on those whose main role is to support people with cardiovascular disease, but this omits a wide range of staff who do not have this as their sole role. There is a danger of using statistics about cardiovascular nursing and medical staff to represent the whole workforce. These roles are crucial, but people with cardiovascular disease receive support from a much wider team so understanding trends in capacity and capability across the wider workforce is crucial

- limited breakdowns of data. Whilst demographic characteristics of the workforce are collected, these are often not divided by speciality in publicly available data

- focusing predominantly on NHS trusts, rather than primary care, community roles such as dieticians and exercise specialists, and social care and the voluntary sector

- reliance on surveys from membership organisations or professional bodies for UK-wide data, where there may be low response rates or membership may not cover all staff

- most detailed data focusing on doctors in England, Scotland and Wales (see Table 10)

There is relatively **good information about the number and type of hospital doctors** working in cardiology, cardiothoracic surgery and paediatric cardiology in England, Scotland and Wales. This is based on NHS speciality data which trusts are incentivised to provide so is considered robust. Surveys and census data from professional societies add to this, including filling some of the gaps about demographic characteristics in publicly available NHS information.

There is **very little data about the number and type of hospital and community nurses** providing cardiovascular care from NHS workforce statistics in any of the UK countries. In England, nurses are assigned a ‘secondary area of work’ on the NHS HR system. This provides some indication of overall numbers. However, this is not likely to be accurate because some nurses providing cardiovascular care will be listed with a different ‘area of work’ such as medicine, outpatients or community health services. Numbers are therefore likely underestimates and we do not know what proportion work on wards, how many are specialist nurses and so on. We did not identify detailed professional society survey or census data specific to nurses providing cardiovascular care either.

There is **very little data about physiologists** working in cardiovascular care. In England, there is some data available but NHS Digital’s workforce statistics combine ‘cardiac, respiratory and sleep sciences’. The British Society of Echocardiography surveyed two thirds of echocardiography leads in 2021 and is planning to survey individual echocardiographers.

There is **very little data about roles in primary care and community care**.

Table 10: Summary of cardiovascular workforce data availability

	Doctors			Nurses			Cardiac physiologists / clinical scientists		
	Speciality	Grade	Demographics	Speciality	Grade	Demographics	Speciality	Grade	Demographics
England	Data available via NHS Digital HR data and RCP census	Data available via NHS Digital HR data and RCP census	Some data available via RCP census (only consultants and higher specialty trainees)	Data available via NHS Digital HR data, but based on 'Area of Work' which is likely to underestimate numbers	Data available via NHS Digital HR data, but based on 'Area of Work' which is not accurate	Not available specific to cardiovascular-roles	Data available via NHS HR data, but cannot separate cardiology from respiratory and sleep-related roles. Some data available from BSE	Data available via NHS HR data, but cannot separate cardiology from respiratory and sleep-related roles. Some data available from BSE	Not available specific to cardiovascular-roles
Scotland	Data available via NHS databases and RCP census	Data available via NHS databases and RCP census	Partial data available via NHS databases and RCP census. NHS data covers sex and age	Not available specific to cardiovascular-roles	Not available specific to cardiovascular-roles	Not available specific to cardiovascular-roles	Some data available about echocardiographers via BSE	Not available specific to cardiovascular-roles	Not available specific to cardiovascular-roles
Wales	Data available via NHS databases and RCP census	Data available via NHS databases and RCP census	Data available via RCP census (only consultants and higher specialty trainees)	Not available specific to cardiovascular-roles	Not available specific to cardiovascular-roles	Not available specific to cardiovascular-roles	Some data available about echocardiographers via BSE	Not available specific to cardiovascular-roles	Not available specific to cardiovascular-roles
Northern Ireland	Data available via RCP census (only consultants and higher specialty trainees)	Data available via RCP census (only consultants and higher specialty trainees)	Data available via RCP census (only consultants and higher specialty trainees)	Not available specific to cardiovascular-roles	Not available specific to cardiovascular-roles	Not available specific to cardiovascular-roles	Some data available about echocardiographers via BSE	Not available specific to cardiovascular-roles	Not available specific to cardiovascular-roles

Source: British Heart Foundation Health Intelligence Team. RCP = Royal College of Physicians. BSE = British Society of Echocardiography.

The stakeholders we spoke with said that gaps in workforce information were a concern. They thought it was important to document the scale of the workforce issue to act as a catalyst to action. They were eager to see a regular audit of the cardiovascular workforce and educational needs and supported our plans for a workforce census. Stakeholders suggested that gap analysis should be undertaken at country level as well as broken down by smaller regions.

They also thought it was important for British Heart Foundation not to focus *solely* on the need to recruit greater workforce numbers in policy and planning work. Stakeholders agreed that increasing the number of people trained is essential, but also suggested we consider:

- whether there is anything **unique** in trends in the cardiovascular workforce compared to the broader NHS workforce that may mean that different solutions are needed
- ways to **enhance retention** and support people to keep working for longer if they wish
- new roles and **ways of working** to make best use of skill mix
- exploring the **wider workforce** contributing to cardiovascular care in social care (which has a similar number of workers to the NHS), primary and community care, and workforce planning for administrative, non-clinical and support roles

Learn more

1 https://www.england.nhs.uk/ourwork/clinical-policy/cvd/
2 https://www.bhf.org.uk/what-we-do/our-research/heart-statistics/heart-statistics-publications/cardiovascular-disease-statistics-2022
3 https://www.longtermplan.nhs.uk/
4 https://www.longtermplan.nhs.uk/online-version/chapter-3-further-progress-on-care-quality-and-outcomes/better-care-for-major-health-conditions/cardiovascular-disease/
5 https://www.nuffieldtrust.org.uk/resource/the-nhs-workforce-in-numbers
6 https://www.nuffieldtrust.org.uk/resource/the-nhs-workforce-in-numbers
7 https://www.nuffieldtrust.org.uk/resource/the-nhs-workforce-in-numbers
8 https://www.nuffieldtrust.org.uk/resource/the-nhs-workforce-in-numbers
9 https://digital.nhs.uk/data-and-information/publications/statistical/nhs-workforce-statistics
10 https://www.ethnicity-facts-figures.service.gov.uk/workforce-and-business/workforce-diversity/nhs-workforce/latest
11 https://data.oecd.org/healthres/doctors.htm
12 https://www.nuffieldtrust.org.uk/resource/the-nhs-workforce-in-numbers
13 https://www.nhsstaffsurveyresults.com/
14 https://www.nuffieldtrust.org.uk/chart/number-of-gps
15 https://digital.nhs.uk/data-and-information/publications/statistical/general-and-personal-medical-services
16 https://digital.nhs.uk/data-and-information/publications/statistical/nhs-workforce-statistics
17 https://www.nuffieldtrust.org.uk/research/the-health-care-workforce-in-england-make-or-break
18 https://digital.nhs.uk/data-and-information/publications/statistical/nhs-vacancies-survey/april-2015---march-2022-experimental-statistics
19 https://www.rcplondon.ac.uk/projects/outputs/focus-physicians-2018-19-census-uk-consultants-and-higher-specialty-trainees
20 https://www.nhsstaffsurveys.com/results/
21 Campbell B, Robinson S, Rana B. The evolution from cardiac physiologists to clinical scientists in the UK: a guide to attaining equivalence. *Echo Res Pract* 2019;6(4):R99-R105.
22 Punshon G, Leary A. *A survey of the echocardiography workforce in the UK*. British Society of Echocardiography, 2022.
23 Mossman K. *National Echocardiography Survey*. 2015.
24 https://nshcs.hee.nhs.uk/programmes/etp/
25 *The Untold Heartbreak*. British Heart Foundation, 2021.
26 Punshon G, Leary A. *A survey of the echocardiography workforce in the UK*. British Society of Echocardiography, 2022.
27 https://www.gov.scot/publications/heart-disease-action-plan/pages/9/
28 Scaglione M, Basilico R, Delli Pizzi A, Iacobellis F, Dick E, Wirth S, Linsenmaier U(8), Calli C, Berger FH, Nieboer KH, Barrio AB, Dumba M, Grassi R, Katulska K, Schueller G, Patlas MN, Laghi A, Muto M, Nicola R, Zins M, Miele V, Hartley R, Katz DS, Derchi L. The practice of emergency radiology throughout Europe: a survey from the European Society of Emergency Radiology on volume, staffing, equipment, and scheduling. *Eur Radiol 2021*;31(5):2994-3001.
29 Dreisbach JG, Nicol ED, Roobottom CA, Padley S, Roditi G. Challenges in delivering computed tomography coronary angiography as the first-line test for stable chest pain. *Heart* 2018;104(11):921-927.
30 *Clinical radiology. UK workforce 2020 census report*. Royal College of Radiologists, 2021.
31 http://www.nhsemployers.org/case-studies-and-resources/2011/07/a-guide-to-consultant-job-planning

32 https://www.rcplondon.ac.uk/projects/outputs/focus-physicians-2018-19-census-uk-consultants-and-higher-specialty-trainees
33 https://www.rcplondon.ac.uk/projects/census-consultant-physicians-and-higher-specialty-trainees-uk
34 https://www.rcpmedicalcare.org.uk/developing-physicians/specialties/cardiology/workforce
35 www.bcs.com/documents/BCSOOHWP_Final_Report_05092016.pdf
36 www.bcs.com/documents/BCS_2015_Workforce_Survey_FINAL_FOR_WEB 22.12.15.pdf
37 Personal communication about draft preliminary unpublished analysis, May 2022
38 https://www.rcplondon.ac.uk/guidelines-policy/census-data-toolkits
39 Curtis AB, Rodriguez F. Choosing a career in cardiology: where are the women? *JAMA Cardiol* 2018;3:691–2.
40 Kemaloglu Oz T, Cader FA, Dakhil ZA, Parapid B, Kadavath S, Bond R, Chieffo A, Gimelli A, Mihailidou AS, Ramu B, Cavarretta E, Michos ED, Kaya E, Buchanan L, Patil M, Aste M, Alasnag M, Babazade N, Burgess S, Manzo-Silberman S, Paradies V, Thamman R. International consensus statement on challenges for women in cardiovascular practice and research in the COVID-19 era. *Minerva Cardiol Angiol* (Published online ahead of print February 2022).
41 Harvey PR, Phillips C, Newbery N, Nagamoottoo D, Woolf K, Trudgill NJ. Ethnic differences in success at application for consultant posts among United Kingdom physicians from 2011 to 2019: a retrospective cross-sectional observational study. *J R Soc Med* (Published online ahead of print March 2022).
42 https://www.rcplondon.ac.uk/projects/outputs/focus-physicians-2018-19-census-uk-consultants-and-higher-specialty-trainees
43 UK Cardiothoracic Surgery. *Workforce report 2019*. A report by the Specialty Advisory Committee and the Society for Cardiothoracic Surgery in Great Britain and Ireland.
44 Westaby S, Baig K, De Silva R, Unsworth-White J, Pepper J. Recruitment to UK cardiothoracic surgery in the era of public outcome reporting. *Eur J Cardiothorac Surg* 2015;47(4):679-83.
45 *Vascular Surgery UK Workforce Report 2014*. Vascular Society of Great Britain & Ireland, 2014.
46 Harkin DW, Beard JD, Shearman CP, Wyatt MG. The vascular surgery workforce: a survey of consultant vascular surgeons in the UK, 2014. *Eur J Vasc Endovasc Surg* 2015;49(4):448-54.
47 https://www.rcoa.ac.uk/sites/default/files/documents/2020-11/Medical-Workforce-Census-Report-2020.pdf
48 Association for Cardiothoracic Anaesthesia and Critical Care. *ATACC National Workforce Survey 2016: Executive Summary and Report*. London: ACTACC, 2016.
49 UK Cardiothoracic Surgery. *Workforce report 2019*. A report by the Specialty Advisory Committee and the Society for Cardiothoracic Surgery in Great Britain and Ireland.
50 Shegafi MB, Nashef S, Starodub R, Lee G. Two decades on - cardiothoracic surgical care practitioners in the UK: a narrative review. *J Cardiothorac Surg* 2020;15(1):39.
51 Personal communication, British Congenital Cardiac Association 2021.
52 Personal communication, British Congenital Cardiac Association 2021.
53 Crossland DS, Ferguson R, Magee A, Jenkins P, Bulock FA, Parry A, Babu-Narayan SV, Carroll A, Daubeney PE, Simpson J. Consultant staffing in UK congenital cardiac services: a 10-year survey of leavers and joiners. *Open Heart* 2021;8:e001723.
54 UK Cardiothoracic Surgery. *Workforce report 2019*. A report by the Specialty Advisory Committee and the Society for Cardiothoracic Surgery in Great Britain and Ireland.
55 Burton H, Alberg C, Stewart A. Mainstreaming genetics: a comparative review of clinical services for inherited cardiovascular conditions in the UK. *Public Health Genomics* 2010;13(4):235-45.
56 *Shortage of consultant paediatricians in the UK*. Report of RCPCH, 2019.
57 Andrews H, Singh Y. Review of paediatric cardiology services in district general hospitals in the United Kingdom. *Cardiol Young* 2016;26(3):528-31.
58 UK Cardiothoracic Surgery. *Workforce report 2019*. A report by the Specialty Advisory Committee and the Society for Cardiothoracic Surgery in Great Britain and Ireland.
59 UK Cardiothoracic Surgery. *Workforce report 2019*. A report by the Specialty Advisory Committee and the Society for Cardiothoracic Surgery in Great Britain and Ireland.
60 Fitzsimons D, Carson MA, Hansen TB, Neubeck L, Tanash MI, Hill L. The varied role, scope of practice, and education of cardiovascular nurses in ESC-affiliated countries: an ACNAP survey. *Eur J Cardiovasc Nurs* 2021;20(6):572-579.

61 UK Cardiothoracic Surgery. *Workforce report 2019*. A report by the Specialty Advisory Committee and the Society for Cardiothoracic Surgery in Great Britain and Ireland.
62 https://www.gettingitrightfirsttime.co.uk/wp-content/uploads/2021/08/Cardiology-Jul21k-NEW.pdf
63 www.rcpmedicalcare.org.uk/developing-physicians/specialties/cardiology/workforce
64 Masters J, Barton C, Blue L, Welstand J. Increasing the heart failure nursing workforce: recommendations by the British Society for Heart Failure Nurse Forum. *Bri J Cardiac Nursing* 2019;14:1-12.
65 McDonagh TA, Blue L, Clark AL et al. European Society of Cardiology Heart Failure Association Standards for delivering heart failure care. *Eur J Heart Fail* 2011;13:22.
66 www.sor.org/sites/default/files/document-versions/diagnostic_workforce_census_2018.pdf
67 Provisional analysis by British Heart Foundation Health Intelligence Team using NHS England workforce statistics, as of September 2021 and January 2022.
68 https://turasdata.nes.nhs.scot/data-and-reports/official-workforce-statistics/all-official-statistics-publications/07-december-2021-workforce/dashboards/nhsscotland-workforce/?pageid=5982
69 Pattenden J, Coulton S, Spilsbury K et al. *The development and impact of the British Heart Foundation and the Big Lottery Fund heart failure specialist nurse service in England*. York: The University of York, 2008.
70 Langhorne P, Baylan S. Early supported discharge services for people with acute stroke. *Cochrane Database Syst Rev* 2017;7:CD000443
71 Damery S, Flanagan S, Combes G. Does integrated care reduce hospital activity for patients with chronic diseases? An umbrella review of systematic reviews. *BMJ Open* 2016;6:e011952.
72 https://www.rbht.nhs.uk/community-pharmacy-future-cardiovascular-care
73 https://www.statista.com/statistics/462235/general-practitioners-employment-in-the-united-kingdom-uk/
74 *General Practice Workforce*, 31 December 2019. NHS Digital.
75 https://www.gmc-uk.org/-/media/documents/what-our-data-tells-us-about-gps_pdf-74830685.pdf
76 Razai MS, Majeed A. General practice in England: The current crisis, opportunities, and challenges. *J Ambul Care Manage* 2022;45(2):135-139.
77 https://www.nursinginpractice.com/latest-news/full-time-practice-nurse-numbers-increase-by-more-than-2/
78 Griffiths P, Murrells T, Maben J, Jones S, Ashworth M. Nurse staffing and quality of care in UK general practice: cross-sectional study using routinely collected data. *Br J Gen Pract* 2010;60(570):36-48.
79 https://www.statista.com/statistics/318874/numbers-of-pharmacists-in-the-uk/
80 Weir NM, Preston K, Newham R, Bennie M. Development of a primary care pharmacy outcomes framework: An umbrella literature review. *Res Social Adm Pharm* 2022;18(5):2757-2777.
81 Barton GR, Goodall M, Bower P, Woolf S, Capewell S, Gabbay MB. Increasing heart-health lifestyles in deprived communities: economic evaluation of lay health trainers. *J Eval Clin Pract* 2012;18(4):835-40.
82 Lawler J, Trevatt P, Elliot C, Leary A. Does the Diabetes Specialist Nursing workforce impact the experiences and outcomes of people with diabetes? A hermeneutic review of the evidence. *Hum Resour Health* 2019;17(1):65.
83 Chambers D, Cantrell A, Booth A. *Implementation of interventions to reduce preventable hospital admissions for cardiovascular or respiratory conditions: an evidence map and realist synthesis.* Southampton: NIHR Journals Library, 2020.
84 Masters J, Barton C, Blue L, Welstand J. Increasing the heart failure nursing workforce: recommendations by the British Society for Heart Failure Nurse Forum. *Brit J Cardiac Nursing* 2019:14(11)1–12.
85 https://pumpingmarvellous.org/wp-content/uploads/2018/09/Heart-Failure-Nurse-Audit-report-2018-Final.pdf
86 http://www. heartfailurehubscotland.co.uk/wp-content/uploads/2019/05/Final-2018-Review-of-Scottish-Heart-Failure-Nurse-Services-doc.pdf
87 Crozier A, Watson PM, Graves LEF, George K, Naylor L, Green DJ, Rosenberg M, Jones H. Clinical exercise provision in the UK: comparison of staff job titles, roles and qualifications across five specialised exercise services. *BMJ Open Sport Exerc Med* 2022;8(1):e001152.

88 Daw P, Withers TM, van Zanten JJCSV, Harrison A, Greaves CJ. A systematic review of provider-and system-level factors influencing the delivery of cardiac rehabilitation for heart failure. *BMC Health Serv Res* 2021;21(1):1267.
89 Personal communication with stakeholder associated with the organisations listed in Box 1.
90 https://www.nuffieldtrust.org.uk/resource/the-nhs-workforce-in-numbers
91 Personal communication with stakeholders associated with the organisations listed in Box 1, 2022.
92 British Cardiovascular Society and SCST. *Strategic Review of Cardiac Physiology Services in England 2015*.
93 NHS England. *Summary: Waiting times and activity for diagnostic tests*. 2016.
94 Cleland JGF, Swedberg K, Follath F et al. The EuroHeart Failure survey programme — a survey on the quality of care among patients with heart failure in Europe. Part 1: patient characteristics and diagnosis *Eur Heart J* 2003;24:442-63.
95 *Centre for Workforce Intelligence Healthcare Scientists Training Capacity Survey*, 2015.
96 Ayers LK, M. *National School of Healthcare Science National Recruitment 2016*. Themed Board report for June 2016.
97 Personal communication with stakeholders associated with the organisations listed in Box 1, 2022.
98 www.specialtytraining.hee.nhs.uk/Portals/1/Content/Resource%20Bank/ Competition%20Ratio%27s/Competition%20Ratios%202018.pdf
99 Personal communication, 2022.
100 BCS, BSE, Society for Cardiological Science & Technology and the British Heart Rhythm Society. *Cardiac physiology workforce options analysis 2016*.
101 Personal communication, 2022.
102 Personal communication with stakeholders associated with the organisations listed in Box 1, 2022.
103 UK Cardiothoracic Surgery. *Workforce report 2019*. A report by the Specialty Advisory Committee and the Society for Cardiothoracic Surgery in Great Britain and Ireland.
104 Yazdani MF, Kotronias RA, Joshi A, Camm CF, Allen CJ. British cardiology training assessed. *Eur Heart J* 2019;40:2475–7.
105 https://www.gmc-uk.org/-/media/documents/training-environments-2018_pdf-76667101.pdf
106 https://bjcardio.co.uk/2020/10/women-not-in-cardiology-where-are-we-going-wrong-a-survey-of-the-perceptions-and-barriers-to-training/
107 Personal communication, 2022.
108 www.researchbriefings.parliament.uk/ResearchBriefing/Summary/CBP-7783#fullreport
109 https://www.nuffieldtrust.org.uk/research/closing-the-gap-key-areas-for-action-on-the-health-and-care-workforce
110 https://www.nuffieldtrust.org.uk/research/closing-the-gap-key-areas-for-action-on-the-health-and-care-workforce
111 Westaby S, Baig K, De Silva R, Unsworth-White J, Pepper J. Recruitment to UK cardiothoracic surgery in the era of public outcome reporting. *Eur J Cardiothorac Surg* 2015;47(4):679-83.
112 Personal communication with stakeholders associated with the organisations listed in Box 1, 2022.
113 Crossland DS, Ferguson R, Magee A, Jenkins P, Bulock FA, Parry A, Babu-Narayan SV, Carroll A, Daubeney PE, Simpson J. Consultant staffing in UK congenital cardiac services: a 10-year survey of leavers and joiners. *Open Heart* 2021;8:e001723.
114 Harkin DW, Beard JD, Shearman CP, Wyatt MG. The vascular surgery workforce: a survey of consultant vascular surgeons in the UK, 2014. *Eur J Vasc Endovasc Surg* 2015;49(4):448-54.
115 Darbyshire D, Brewster L, Isba R, Body R, Basit U, Goodwin D. Retention of doctors in emergency medicine: a scoping review of the academic literature. *Emerg Med J* 2021;38(9):663-672.
116 Gray K, Wilde R, Shutes K. Enhancing nurse satisfaction: an exploration of specialty nurse shortage in a region of NHS England. *Nurs Manag* 2018;25(1):26-33.
117 Lees L, Myers L. A profile of nurses working in acute medicine units: what is the future? *Acute Med* 2010;9(2):91-6.
118 Personal communication with stakeholders associated with the organisations listed in Box 1, 2022.
119 Lambert TW, Smith F, Goldacre MJ. Why doctors consider leaving UK medicine: qualitative analysis of comments from questionnaire surveys three years after graduation. *J R Soc Med* 2018;111(1):18-30.

120 https://www.bma.org.uk/collective-voice/policyand-research/education-training-and-workforce/eu-doctors-survey
121 UK Cardiothoracic Surgery. *Workforce report 2019*. A report by the Specialty Advisory Committee and the Society for Cardiothoracic Surgery in Great Britain and Ireland.
122 Personal communication with stakeholders associated with the organisations listed in Box 1, 2022.
123 Royal College of Anaesthetists. *Medical Workforce Census Report 2020*.
124 Weigel KS, Kubik-Huch RA(2), Gebhard C. Women in radiology: why is the pipeline still leaking and how can we plug it? *Acta Radiol* 2020;61(6):743-748.
125 https://bjcardio.co.uk/2020/10/women-not-in-cardiology-where-are-we-going-wrong-a-survey-of-the-perceptions-and-barriers-to-training/
126 Jaijee SK, Kamau-Mitchell C, Mikhail GW, Hendry C. Sexism experienced by consultant cardiologists in the United Kingdom. *Heart* 2021;107(11):895-901.
127 Camm CF, Joshi A, Moore A, Sinclair HC, Westwood M, Greenwood JP, Calver A, Ray S, Allen C. Bullying in UK cardiology: a systemic problem requiring systemic solutions. *Heart* 2022;108(3):212-218.
128 Wah TM, Belli AM. The interventional radiology (ir) gender gap: a prospective online survey by the Cardiovascular and Interventional Radiological Society of Europe (CIRSE). *Cardiovasc Intervent Radiol* 2018;41(8):1241-1253.
129 Smith F, Lambert TW, Pitcher A, Goldacre MJ. Career choices for cardiology: cohort studies of UK medical graduates. *BMC Med Educ* 2013;13:10.
130 Vlastos D, Chauhan I, Mensah K, Cannoletta M, Asonitis A, Elfadil A, Petrou M, De Souza A, Quarto C, Bhudia SK, Rosendahl U, Pepper J, Asimakopoulos G. The impact of COVID-19 pandemic on aortic valve surgical service: a single centre experience. *BMC Cardiovasc Disord* 2021;21(1):434.
131 Kirkley K, Benedetto U, Caputo M, Angelini GD, Vohra HA. The ongoing impact of COVID-19 on adult cardiac surgery and suggestions for safe continuation throughout the pandemic: a review of expert opinions. *Perfusion* 2022;37(4):340-349.
132 Osman F, Caplin N(2), Bashir M. COVID-19: The rising cost of cardiac surgery and disease. *J Card Surg* 2021;36(5):1593-1596.
133 Anthony J, Prabhakar CRK, Clift P, Hudsmith L. COVID-19 and adult congenital heart disease services: impact on support and advice from nurse specialists. *Br J Nurs* 2021;30(12):730-732.
134 Kanwal A, Surkova E. The assimilation of international medical graduates into the cardiovascular workforce. A tale of 2 countries. *JACC Case Reports* 2020;2(3):508-12.
135 Boon N, Norell M, Hall J, Jennings K, Penny L, Wilson C, Chambers J, Weston R. National variations in the provision of cardiac services in the United Kingdom: second report of the British Cardiac Society Working Group, 2005. *Heart* 2006;92:873–878.
136 Brown KL, Pagel C, Pienaar A, Utley M. The relationship between workload and medical staffing levels in a paediatric cardiac intensive care unit. *Intensive Care Med* 2011;37(2):326-33.
137 UK Cardiothoracic Surgery. *Workforce report 2019*. A report by the Specialty Advisory Committee and the Society for Cardiothoracic Surgery in Great Britain and Ireland.
138 https://www.gov.scot/publications/heart-disease-action-plan/pages/6/
139 *Cardiac Workforce Toolkit. Featuring Echo, Surgical Care, and Rehabilitation*. NHS England, 2022.
140 Personal communication with stakeholder associated with the organisations listed in Box 1.
141 https://www.gov.scot/publications/heart-disease-action-plan/pages/6/
142 https://www.gov.scot/publications/national-workforce-strategy-health-social-care/pages/9/
143 Personal communication with stakeholders associated with the organisations listed in Box 1, 2022.
144 Wong BLH, Siepmann I, Chen TT, Fisher S, Weitzel TS, Nathan NL, Saminarsih DS. Rebuilding to shape a better future: the role of young professionals in the public health workforce. *Hum Resour Health* 2021;19(1):82.
145 Personal communication with stakeholders associated with the organisations listed in Box 1, 2022.

146 Qadi O, Lufumpa N, Adderley N, Bem D, Marshall T, Kokab F. Patients' and health professionals' attitudes and perceptions towards the initiation of preventive drugs for primary prevention of cardiovascular disease: a systematic review of qualitative studies. *BJGP Open* 2020;4(5):bjgpopen20X101087.
147 Beech J, Bottery S, Charlesworth A, Evans H, Gershlick B, Hemmings N, Imison C, Kahtan P, McKenna H, Murray R, Palmer B. *Closing the gap. Key areas for action on the health and care workforce*. London: The Health Foundation, The King's Fund, Nuffield Trust, 2020.
148 Beech J, Bottery S, Charlesworth A, Evans H, Gershlick B, Hemmings N, Imison C, Kahtan P, McKenna H, Murray R, Palmer B. *Closing the gap. Key areas for action on the health and care workforce*. London: The Health Foundation, The King's Fund, Nuffield Trust, 2020.
149 Personal communication with stakeholders associated with the organisations listed in Box 1, 2022.
150 Weir NM, Preston K, Newham R, Bennie M. Development of a primary care pharmacy outcomes framework: An umbrella literature review. *Res Social Adm Pharm* 2022;18(5):2757-2777.
151 UK Cardiothoracic Surgery. *Workforce report 2019*. A report by the Specialty Advisory Committee and the Society for Cardiothoracic Surgery in Great Britain and Ireland.
152 Beech J, Bottery S, Charlesworth A, Evans H, Gershlick B, Hemmings N, Imison C, Kahtan P, McKenna H, Murray R, Palmer B. *Closing the gap. Key areas for action on the health and care workforce*. London: The Health Foundation, The King's Fund, Nuffield Trust, 2020.
153 Bronicki RA, Pollak U, Argent AC, Kumar RK, Balestrini M, Cogo P, Cury Borim B, De Costa K, Beca J, Shimizu N, Dominguez TE. Global perspective on training and staffing for paediatric cardiac critical care. *Cardiol Young* 2017;27(S6):S9-S13.
154 Nissen AP, Smith JA, Schmitto JD, Mariani S, Almeida RMS, Afoke J, Asai T, Luc JGY, Shapira OM, Mennander A, Tanaka A, Kaleda VI, Wan S, Wick A, Reichenspurner H, Cohn BM, Nguyen T. Global perspectives on cardiothoracic, cardiovascular, and cardiac surgical training. *J Thorac Cardiovasc Surg* 2020:S0022-5223(20)30218-X.
155 Personal communication with stakeholders associated with the organisations listed in Box 1, 2022.
156 Astin F, Carroll DL, Ruppar T, Uchmanowicz I, Hinterbuchner L, Kletsiou E, Serafin A, Ketchell A. A core curriculum for the continuing professional development of nurses: Developed by the Education Committee on behalf of the Council on Cardiovascular Nursing and Allied Professions of the ESC. *Eur J Cardiovasc Nurs* 2015;14(3):190-7.
157 Beech J, Bottery S, Charlesworth A, Evans H, Gershlick B, Hemmings N, Imison C, Kahtan P, McKenna H, Murray R, Palmer B. *Closing the gap. Key areas for action on the health and care workforce*. London: The Health Foundation, The King's Fund, Nuffield Trust, 2020.
158 https://www.bsecho.org/Public/Education/Posters-and-guides-subpages/PUA001-triaging-posters.aspx
159 https://www.bsecho.org/Public/Education/Posters-and-guides-subpages/PUA005-primary-care-triaging-poster.aspx
160 www.hee.nhs.uk/our-work/advanced-clinical-practice/what-advanced-clinical-practice
161 Beech J, Bottery S, Charlesworth A, Evans H, Gershlick B, Hemmings N, Imison C, Kahtan P, McKenna H, Murray R, Palmer B. *Closing the gap. Key areas for action on the health and care workforce*. London: The Health Foundation, The King's Fund, Nuffield Trust, 2020.
162 De Kock JH, Latham HA, Leslie SJ, Grindle M, Munoz SA, Ellis L, Polson R, O'Malley CM. A rapid review of the impact of COVID-19 on the mental health of healthcare workers: implications for supporting psychological well-being. *BMC Public Health* 2021;21(1):104.
163 https://www.bsecho.org/Public/News/Articles/2021/2021-09/202109-LAA001.aspx
164 Vascular Society of Great Britain & Ireland. *Vascular Surgery UK Workforce Report 2014*.
165 *The NHS Long Term Plan*, 2019.
166 *Interim NHS People Plan*, 2019.
167 https://www.gov.scot/publications/heart-disease-action-plan/pages/9/
168 Kopasker D, Islam MK, Gibson J, Lau YS, Sutton M, Askildsen JE, Bond C, Elliott R. Skill mix and patient outcomes: A multi-country analysis of heart disease and breast cancer patients. *Health Policy* 2020;124(10):1074-1082.

169 Joshi R, Thrift AG, Smith C, Praveen D, Vedanthan R, Gyamfi J, Schwalm JD, Limbani F, Rubinstein A, Parker G, Ogedegbe O, Plange-Rhule J, Riddell MA, Thankappan KR, Thorogood M, Goudge J, Yeates KE. Task-shifting for cardiovascular risk factor management: lessons from the Global Alliance for Chronic Diseases. *BMJ Glob Health 2018*;3(Suppl 3):e001092.
170 UK Cardiothoracic Surgery. *Workforce report 2019*. A report by the Specialty Advisory Committee and the Society for Cardiothoracic Surgery in Great Britain and Ireland.
171 Personal communication with stakeholders associated with the organisations listed in Box 1, 2022.
172 Peletidi A, Nabhani-Gebara S, Kayyali R. The role of pharmacists in cardiovascular disease prevention: qualitative studies from the United Kingdom and Greece. *J Res Pharm Pract* 2019;8(3):112-122.
173 Mills K, Harte E, Martin A, MacLure C, Griffin SJ, Mant J, Meads C, Saunders CL, Walter FM, Usher-Smith JA. Views of commissioners, managers and healthcare professionals on the NHS Health Check programme: a systematic review. *BMJ Open* 2017;7(11):e018606.
174 Savickas V, Veale EL, Bhamra SK, Stewart AJ, Mathie A, Corlett S. Pharmacists detecting atrial fibrillation in general practice: a qualitative focus group study. *BJGP Open* 2020;4(3): bjgpopen20X101042.
175 *The Future of Cardiology*. A Paper Produced by the British Cardiovascular Society Working Group on The Future of Cardiology, 2020.
176 Cardiology. GIRFT Programme National Specialty Report, 2021.
177 O'Doherty AF, Humphreys H, Dawkes S, Cowie A, Hinton S, Brubaker PH, Butler T, Nichols S. How has technology been used to deliver cardiac rehabilitation during the COVID-19 pandemic? An international cross-sectional survey of healthcare professionals conducted by the BACPR. *BMJ Open* 2021;11(4):e046051.
178 *The future of CVD care in an evolving system*. Berkshire: Heart UK, 2021.
179 https://www.exeter.ac.uk/news/research/title_860976_en.html
180 Neubeck L, Hansen T, Jaarsma T, Klompstra L, Gallagher R. Delivering healthcare remotely to cardiovascular patients during COVID-19 : A rapid review of the evidence. *Eur J Cardiovasc Nurs* 2020;19(6):486-494.
181 Elawady A, Khalil A, Assaf O, Toure S, Cassidy C. Telemedicine during COVID-19: a survey of health care professionals' perceptions. *Monaldi Arch Chest Dis* 2020;90(4).
182 *Getting it Right First Time: Cardiology*, 2021.
183 https://digital.nhs.uk/data-and-information/find-data-and-publications/supplementary-information/2018-supplementary-information-files/staff-numbers/hchs-staff-by-staff-group-gender-and-age-january-2018
184 BMA, *Rest, recover, restore: getting UK health services back on track*, 2021.
185 *One in eleven NHS workers plan to leave healthcare sector after pandemic*. YouGov, 2021.