

NUCLEAR MEDICINE



This document sets out factors that will be considered when assessing the supply and requirement of the future medical workforce. The first section of the fact sheet focuses on the future requirement of the specialty, the second section focuses on the current supply. This information will form part of the body of evidence used to advise recommendations of future medical training numbers. At this stage it does not present conclusions or recommendations. This is a live document that represents work in progress and will be updated on an ongoing basis as information is located and made available to the CfWI. The CfWI welcomes relevant contributions to the content or interpretation of information within the medical specialty workforce fact sheets.

As a guide, the document is set out in the following divisions. Some of the themes that have been identified may overlap several divisions.

Considerations for future requirements

- Current Status of Specialty's Requirement
- Demographics
- Health and Lifestyle
- Prevalence and estimated future incidence of factors that affect requirement
- Changes in practice which may affect level of service
- Finished Consultant Episodes (FCEs) and Outpatient Attendances
- Weighted Capitation

Historical and forecast supply

- Existing Workforce
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CONSIDERATIONS FOR FUTURE REQUIREMENTS

Current Status of Specialty's Requirement

Demand for trained specialists in Nuclear Medicine is increasing. The major drivers for this rise in demand include the ageing population and consequently the rise of incidents of cancer in the country. The implications of the 2007 National Radiotherapy Advisory Group (NRAG) indicate an increased demand for Nuclear Medicine consultants and the necessary expansion of services.

According to the Royal College of Physicians (RCP), "investment in the specialty has lagged behind that in other countries, which has resulted in a fragmented service and poorly developed career opportunities. This is at a time when the developments in radionuclide research and service should be stimulating an increase in academic units and service delivery." (Royal College of Physicians, 2008). The RCP further contends that 300-350 FTE would barely meet the service requirements due to the increasing complexity of work especially in specialised areas of activity.

Academic physicians make a significant contribution to the clinical work in their departments, but they have similar responsibilities in terms of teaching and research as other academics, with the exact balance being determined locally.

The RCP suggests that there is an urgent need to rethink the planned trajectory for nuclear medicine consultant numbers to cope with future service requirements in light of the above issues as well as the fact that many consultants were already working in the specialty for periods well above their contracted sessions. Additionally the trend to part-time flexible working will place further stress on workforce requirements.

Vacancies and Locum staff

The three-month vacancy rate for Nuclear Medicine consultants is 0% on average for the whole of England (Information Census Vacancy Survey, 2008).

Demographics

Figure 1 (below) shows growth of the population up to 2031 by age band as predicted by the ONS. It indicates that the greatest growth of the population is in the over 60s. The bold lines indicate the level of the population in 2031.

Figure 1: 2031 population estimate and Indication of age and gender of the population which relies most heavily on Nuclear Medicine

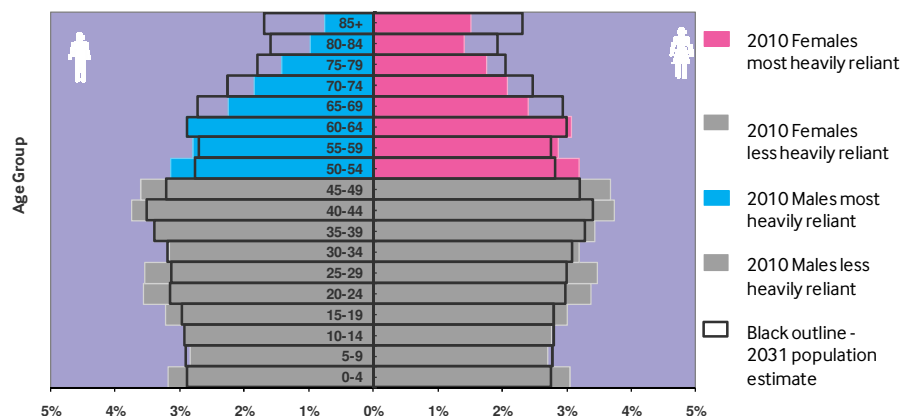


Figure 1 indicates the age and gender of the population which relies most heavily on Nuclear Medicine. The blue area is the male age range whereas the pink area is the female age range which requires the most significant portion of Nuclear Medicine services. Figure 1 indicates that the older adult and elderly population is most heavily reliant on Nuclear Medicine.

Figure 2: Demographic Summary

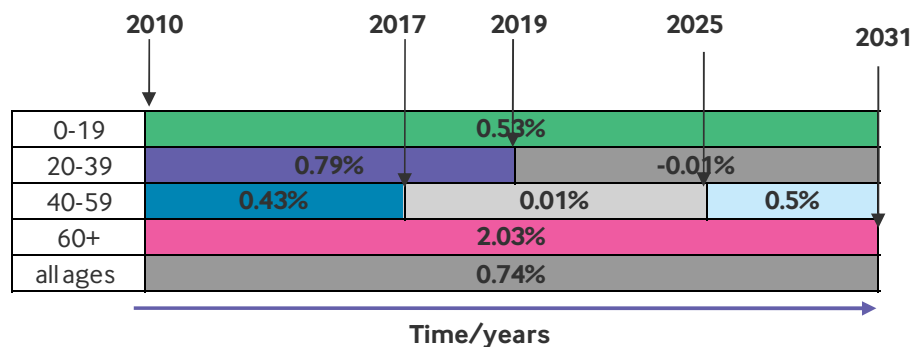


Figure 2 displays the relative population percentage growth per year broken down by age groups highlighting the variable rates over time and age. In Nuclear Medicine the age group which accounts for the most significant proportion of care required is generally the elderly adult population (over 60s). The average growth of the elderly adult population is about 2%.

Health and Lifestyle

Lifestyle Influences

Table 1 shows the trends in lifestyle behaviours for a select set of behaviours which are indicators to the possible health requirement for Nuclear Medicine.

Table 1: Trends in lifestyle behaviours for a select number of behaviours

Lifestyle behaviour		2000	2001	2002	2003	2004	2005	2006	2007	2008
Smoking	%	27	27	26	25	25	24	22	21	21
Drinking (adult males)	%	28	27	27	(-)	(-)	24	31	(-)	28
Drinking (adult females)	%	17	15	17	(-)	(-)	13	20	(-)	19
Binge drinking (adult males)	%	21	21	21	23	23	18	23	25	21
Binge drinking (adult females)	%	9	9	9	9	9	8	15	16	14
Obesity (children)	%	12.1	13.3	15.8	14.1	14.6	17.3	15.5	15.5	13.9
Obesity (adult males)	%	21	21	22.1	22.2	22.7	22.1	23.7	23.6	24.1
Obesity (adult females)	%	21.4	23.5	22.8	23	23.2	24.3	24.2	24.4	24.9

Source: DH Health Profile for England, published March 2010

(-) Indicates no available data

The table indicates that smoking in adults has been decreasing in recent years. Drinking in adults has fluctuated since 2000 with a high of 31% in 2006 for men and 20% in 2006 for women and a low of 24% in 2005 and 13% in 2005 for women. There is no evidence to suggest that drinking will not stay between these extremes in the near future. Binge drinking for males in 2008 (21%) is at the same level it was in 2000 after peaking in 2007 at 25%. In females, however, the recent trend is a decreasing one although it is still higher in 2008 (14%) than it was in 2005 (8%). Obesity in children is on the decline and may drop below 10% by 2012 if the recent trend holds. Obesity in adults, however, is still rising although there is an indication that it may be flattening out.

A cross-cutting specialty

Nuclear Medicine provides major inputs into oncology, cardiology, nephro-urology, orthopaedics, rheumatology, neuropsychiatry as well as nuclear cardiology, metabolic bone disease, and paediatrics. As a result of this large cross-section of disciplines which Nuclear Medicine contributes to, lifestyle behaviours which affect the requirement for services for any of the above specialities will have a knock-on effect on the requirement for consultants in Nuclear Medicine. Please see the relevant fact sheet for more information on lifestyle behaviours which may affect the requirements for oncology, cardiology, neurology, radiology, urology, orthopaedics, rheumatology, endocrinology and psychiatry.

Cancer

Any lifestyle behaviour which has been identified to increase the risk of cancer will have an effect on the requirement for consultants in Nuclear Medicine. Behaviours such as smoking, drinking, poor diet, use of oral contraceptives, hormone replacement therapy, and significant exposure to sunlight all increase the risk of developing cancer. For more details on lifestyle behaviours which may lead to cancer, please see the Medical and Clinical Oncology fact sheets.

Prevalence and estimated future incidence of factors that affect requirement

Table 2: UK estimates of total cancer prevalence

Cancer Type	UK 2008 estimates ¹
Breast (female)	550000
Large bowel	250000
Prostate	215000
Lung	65000
Other	920000
All cancers	2000000

¹ (based on diagnoses 1971-2004 applied to 2008 population; Thames Cancer Registry, 2008)
Source: Cancer Research UK

According to Cancer Research UK, "Overall, it is estimated that there are now 2 million cancer survivors in the UK, or approximately 3.3% of the population of the UK¹. This figure is rising at an estimated 3.2% per year, with the single cancer that contributes most to this total being breast cancer, with an estimated 550,000 women alive who have had a diagnosis of breast cancer. Overall, 10% of the total UK population over the age of 65 years is now a cancer survivor.

These latest estimates are much higher than previous forecasts of cancer prevalence. This is mainly because incidence has been rising whilst the death rates have continued to fall, leading to better survival. This trend is expected to continue over the coming years as a result

of a number of factors, including an ageing population, earlier detection of cancer and continued improvements in treatment.”

The rate of lung cancer is decreasing; however the number of cases is increasing due to the aging population. Breast cancer incidence rates in the UK have increased by 5% over the past 10 years. Eighty percent of breast cancer cases are diagnosed in women over 50. Bowel cancer incidence rates have remained relatively stable over the past 10 years. Eighty percent of bowel cancer is diagnosed in people over 60. More than 50% of all prostate cancer cases are diagnosed in men over 70. Increased use of Prostate Specific Antigen (PSA) testing has increased the rate of survival from prostate cancer, so more men are living with prostate cancer.

Figure 3: Number of new cases and rates, by age and sex, all malignant neoplasms (excluding non-melanoma skin cancer), UK, 2007 (Cancer Research UK)

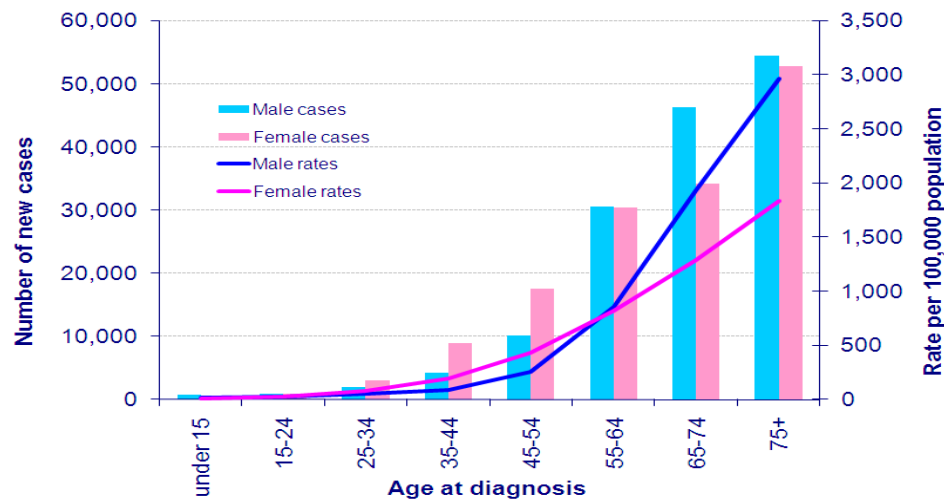
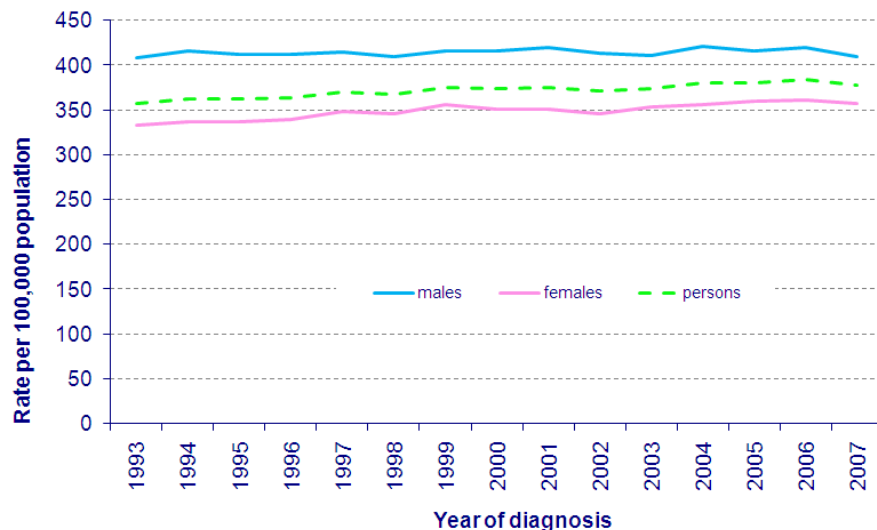


Figure 3 shows that the aging population accounts for the vast majority of the number of new cases of malignant neoplasms in the UK.

It is estimated that more than one in three people will develop some form of cancer during their lifetime. This compares to an estimated risk of 1 in 27 for people aged up to 50 years. (Cancer Research, UK)

Breast cancer accounts for nearly half (46%) of all cancers diagnosed in UK women aged 40-59 years.

Figure 4: Age-standardised (European) incidence rates, all cancers excluding non-melanoma skin cancer, by sex, UK, 1993-2007



If current cancer incidence rates remain the same, by 2025 there will be an additional 100,000 cases of cancer diagnosed each year as a result of the ageing population (Cancer Research UK).

Changes in practice which may affect level of service

Nuclear medicine is a consultant-delivered service. In the RCP census of 2003, the most recent data available, it shows that there were a significant number of academic physicians in nuclear medicine, with 40% holding at least a part-time academic contract. Requirement for consultants in Nuclear Medicine would be significantly affected if work practice should change to a specialist- or consultant-delivered service provided seven days a week as most departments do not currently provide on-call services.

According to Medical Careers:

Nuclear medicine deals with a range of pathology across all age ranges, but specific clinical practice involves major input in:

- oncology
- cardiology
- nephro-urology
- orthopaedics
- rheumatology

Services are hospital based and are either integrated with other radiology facilities or comprise their own independent department. The range of diagnostic investigations has increased over recent years, with continuing radiopharmaceutical development and the wider availability of equipment like tomographic gamma cameras and positron emission tomography (PET) imaging systems.

Advances in drug radio-labelling and delivery systems have led to a parallel expansion in unsealed source therapy, extending the range of conditions that can be treated by this approach. This, together with the expanding role of nuclear cardiology studies in coronary heart disease, the rising importance of PET scans in cancer staging, and the delivery of sentinel node imaging in patients with breast cancer and melanoma, will have a major positive impact upon the importance of the specialty.

Department of Health – two week wait

Government policy in 2010 gave patients the right to an appointment for suspected cancer in urgent cases within two weeks of referral by their General Practitioner.

Finished Consultant Episodes (FCEs) and Outpatient Attendances

Figure 5: FCE per year for Nuclear Medicine

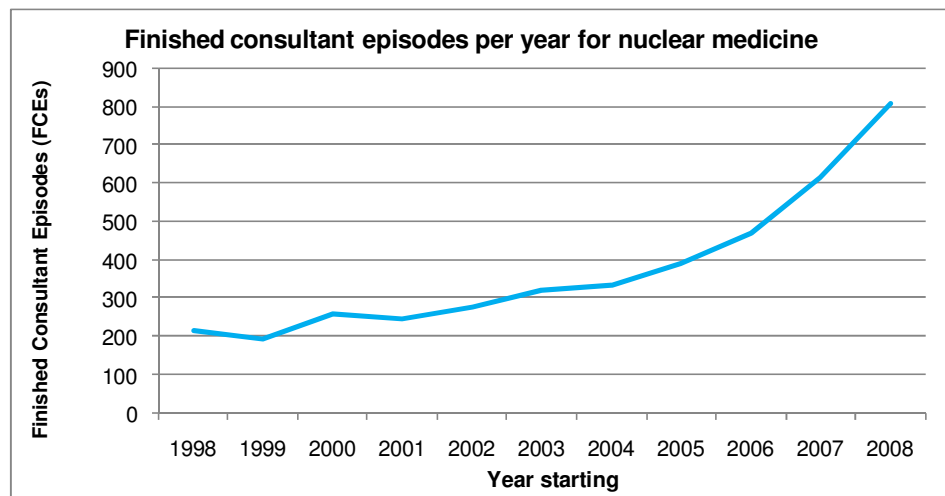
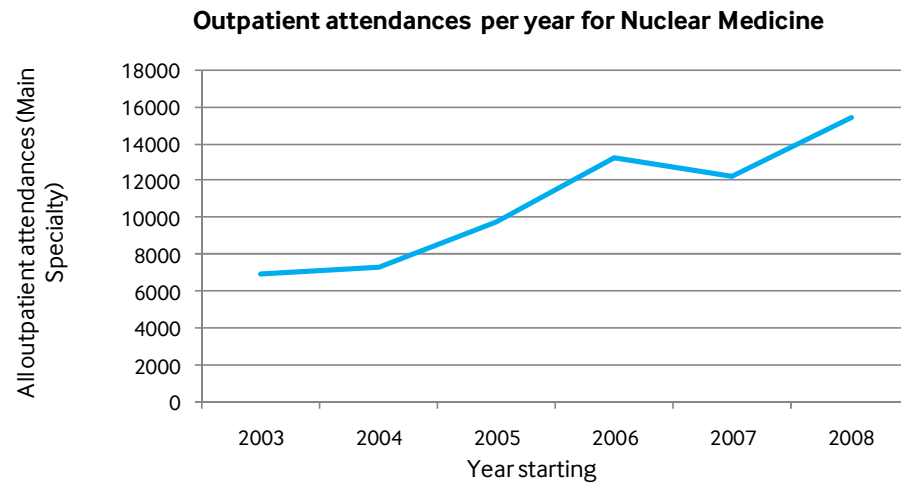


Figure 5 shows Finished Consultant Episode (FCE) data for Nuclear Medicine over 10 years up to 2008. It is assumed that the recording and definition of FCEs in this speciality has not changed significantly over this time period, and therefore the rise in FCEs indicates an increase of activity in the speciality. It should be noted that the data in the chart does not represent all the activity in this speciality; outpatient data is not covered, which makes up a proportion of the Nuclear Medicine service (see Figure 6).

Source: The NHS Information Centre, Hospital Episode Statistics for England. Inpatient statistics, 2005-2008.

Figure 6: All outpatient attendances per year for Nuclear Medicine



Source: The NHS Information Centre Hospital Episode Statistics, Main specialty Outpatient attendances for England, 2003 – 2008

Figure 6 shows that the outpatient numbers for Nuclear Medicine are low but have almost tripled since 2003. Verification that this data is appropriate for an analysis should be sought from a the speciality

Weighted Capitation

Table 3: Table of six scenarios for each SHA based on weighted capitation for the possible requirements of junior doctors – Nuclear Medicine

SHA	Ratio of Actual : Weighted Capitation	Move All to Average Value	Move All to Median Value	Move All to Min	Move All to 2nd Min	Move All to 2nd Max	Move All to Max
		1.15	0.61	0.00	0.47	2.78	2.99
North East	0.00	min	min	min	min	min	min
North West	1.39	-1	-2	-4	-3	4	5
Yorkshire & The Humber	0.00	min	min	min	min	min	min
East Midlands	0.61	1	0	-1	0	4	4
West Midlands	0.47	1	0	-1	0	5	5
East of England	0.52	1	0	-1	0	4	5
London	2.99	max	max	max	max	max	max
South East Coast	2.78	-2	-3	-4	-3	0	0
South Central	0.00	min	min	min	min	min	min
South West	0.00	min	min	min	min	min	min
Total		1	-5	-11	-6	17	19
% change		0.2%	-1.5%	-3.4%	-2.0%	5.3%	5.9%

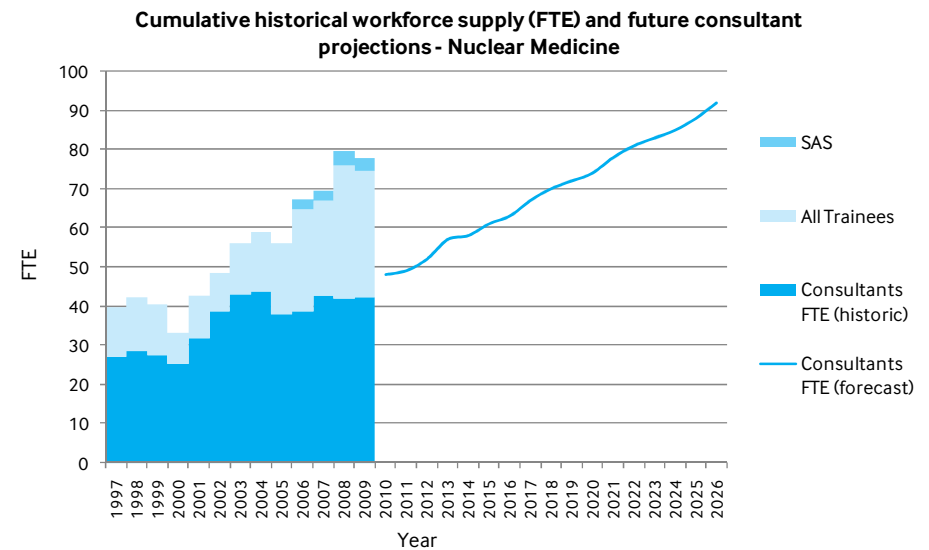
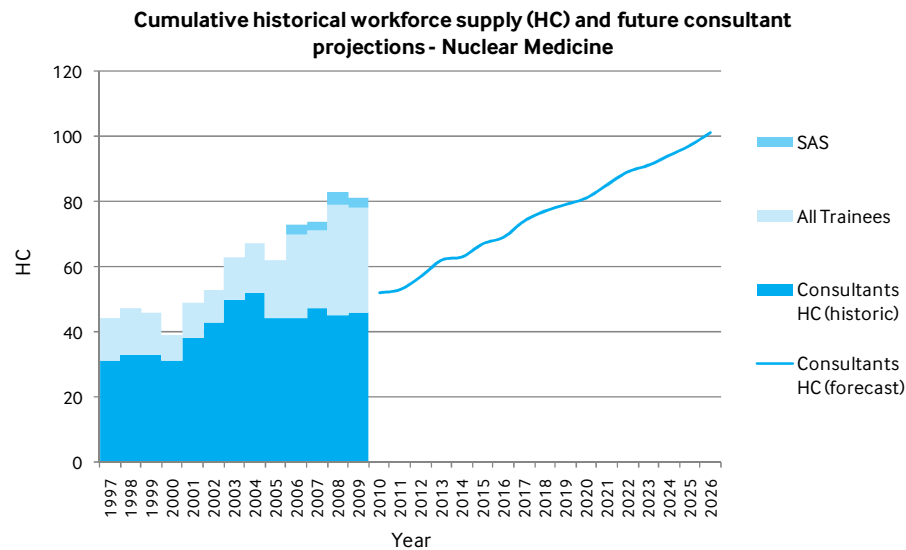
The table above displays six scenarios based on weighted capitation (WCAP) alone for the possible requirements of junior doctors in Nuclear Medicine. Column 2 is the ratio of the actual capitation to the calculated theoretical capitation. Columns 3-8 are the scenarios where all except the most under capitated and the most over-capitated are moved to the mean, median, least, 2nd least, 2nd most and most capitated levels respectively. The values in the 2nd row are the mean, median, least capitated, 2nd least capitated, the 2nd most and most capitated respectively.

This analysis reveals that change in requirements range from an increase of 5.3% (2nd most capitated) to a decrease of 2% (2nd least capitated) on average when only weighted capitation is considered for Nuclear Medicine.

HISTORICAL AND FORECAST SUPPLY

The supply of the Nuclear Medicine workforce and forecast of consultant neurologists are shown in Figures 7a-b. The figures are based upon the latest data available (SAS data only dates back to 2005).

Figures 7a-b: (a) Workforce supply (FTE), and (b) Workforce supply (HC) – Nuclear Medicine



The charts above show that the consultant workforce contracted by 0.6% during the past five years based upon the Information Centre (IC) census. The trend is reflected by middle grade medical staff together with trainees (which are defined as those in the F2, SHO and registrar groups). The supply of nuclear medicine consultants over the next ten years is forecast to increase to 70 FTE in 2018 (77 headcount), an average increase of 5.2% (FTE) annually, based on the following assumptions:

- retirement occurs at 60 years of age
- 30% of current trainees are delayed in completing their training by one year, 5% are delayed by two years, 5% by three years and 5% by four years
- there are two international recruits per annum, two young leavers (non-retirements) and no returners per annum,
- there is no conversion from staff grade or associate specialist posts to consultant posts
- there is a wastage rate amongst registrars of 1%.

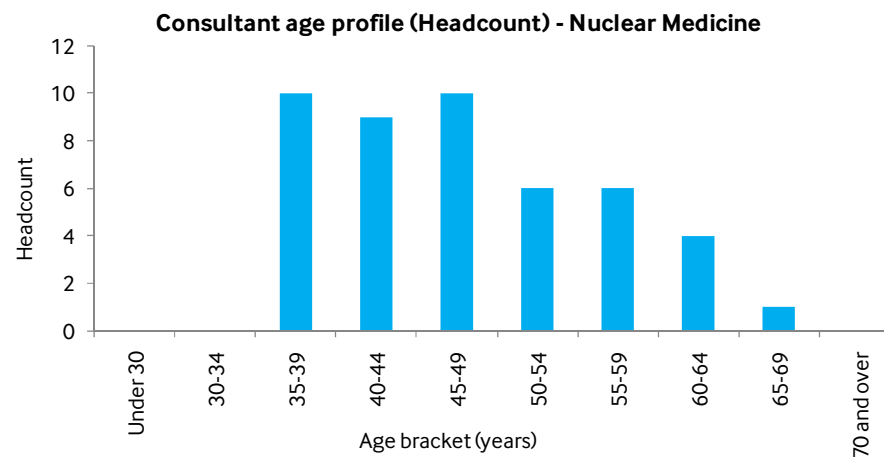
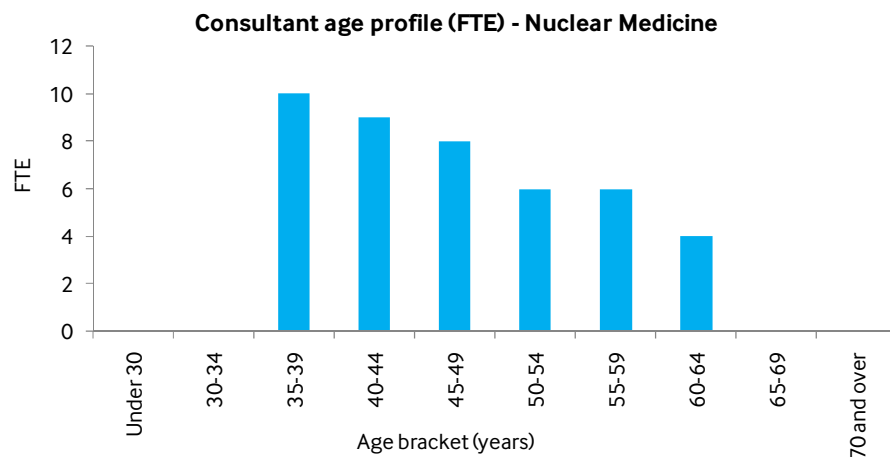
Existing Workforce

Supply

According to the 2009 IC census there are 42 FTE (46 headcount) consultants, while Electronic Staff Records (ESR) from September 2009 show 45 FTE (50 headcount). This is a difference of 6% in comparison to census records. The latest available data records 45 FTE consultants (50 headcount) (extracted via iView from ESR, March 2010).

The age profile of the current consultant workforce as at September 2009 is shown in Figures 8a-b.

Figures 8a-b: (a) age profile (FTE) and, (b) age profile (Headcount) – Nuclear Medicine consultants



The charts show a plentiful supply of younger staff, with the greatest proportion of consultants are falling in the 35-44 age brackets, however there is a significant proportion of the workforce above 50. This does not indicate a significant impending retirement bulge.

The IC three-month vacancy rate for all radiology consultants is 0.8% as of March 2008 (the latest available data); the three-month vacancy rate for Nuclear Medicine consultants is lower at 0%.

Geographic Distribution

Tables 4a and b below show the geographic distribution of doctors and trainees in absolute values and in relation to the weighted capitation of each Strategic Health Authority (SHA) (a definition of weighted capitation is given below*).

Tables 4a-b: (a) Number of doctors minus the weighted capitation, (b) Actual number of doctors, by grade and SHA for Nuclear Medicine

		Number of doctors minus the weighted capitation, shown for Nuclear Medicine by SHA - Based on latest data available as at April 2010					Actual number of doctors by grade and SHA, shown for Nuclear Medicine - Based on latest data available as at April 2010				
		Table a					Table b				
SHA	Weighted Capitation	Junior doctors	Staff grade	Specialty Doctor	Associate specialist	Consultant	Junior doctors	Staff grade	Specialty Doctor	Associate specialist	Consultant
North East	5.9%	-1	0	0	0	-2	0	0	0	0	0
North West	15.2%	1	1	0	0	-1	4	1	0	0	5
Yorkshire & The Humber	10.8%	-2	0	0	0	-5	0	0	0	0	0
East Midlands	8.6%	-1	0	0	0	-4	1	0	0	0	0
West Midlands	11.2%	-1	0	0	0	-3	1	0	0	0	2
East of England	10.2%	-1	0	0	0	-1	1	0	0	0	4
London	14.1%	5	1	0	1	14	8	1	0	1	20
South East Coast	7.6%	3	0	0	0	3	4	0	0	0	6
South Central	6.6%	-1	0	0	0	0	0	0	0	0	3
South West	9.8%	-2	0	0	0	-1	0	0	0	0	3
Total	100%						19	2	0	1	42

Tables 4 a and b suggest that, out of the ten SHAs, NHS London and South East Coast are 'over-capitated' in both consultants and junior doctors, i.e. they have a greater proportion of England's junior doctors than if provision were to follow weighted capitation, whereas are of the other regions are under-capitated in either junior doctors and/or consultants. This table indicates a skewed geographic distribution.

*The Department of Health uses a weighted capitation formula (WCAP) to distribute resources to primary care trusts (PCTS) based on the relative health needs of each PCT's catchment area. If qualified doctors and trainees were equitably distributed according to the formula, all other columns in tables 3a would be zero. Values greater than zero indicate that the SHA has more doctors and trainees than would be included by WCAP; values less than zero indicate evidenced room for growth of the workforce.

Recruitment 2009

The level of recruitment to further medical training is shown in Table 5. The table illustrates the situation at point of entry in 2009. The data corresponds to posts openly advertised but not those training posts secured by 'run-through' trainees.

Table 5: 2009 Specialty Recruitment for Nuclear Medicine at ST3 (as of October 2009)

Deanery	Available Posts	Accepted Posts	Fill Rate
East Midlands	0	0	-
East of England	1	1	100%
Kent, Surrey and Sussex	0	0	-
London	4	1	25%
Mersey	0	0	-
North West	0	0	-
Northern	0	0	-
Oxford	0	0	-
Peninsula	0	0	-
Severn	0	0	-
West Midlands	0	0	-
Wessex	0	0	-
Yorkshire and the Humber	0	0	-
Total	5	2	40%

The table shows that only 40% of posts were filled as of October 2009. In CfWI's view, the degree to which the current number of available posts are filled together with geographic distribution are essential factors in evaluating the requirement for additional posts.

Related Healthcare Workforce

Nuclear Medicine consultants work alongside other specialists in oncology, cardiology, nephro-urology, orthopaedics, rheumatology, neuropsychiatry as well as nuclear cardiology, metabolic bone disease, and paediatrics. Integration with palliative care services is vital in the provision of appropriate care.

Non-medical personnel are essential to the routine provision of a nuclear medicine service. Staffing arrangements vary between departments, but the team may include:

- physicists and other clinical scientists
- medical technical officers
- radiographers
- radio pharmacists
- specialist nuclear medicine nurses, including nurse practitioners
- medical laboratory scientific officers.

Play specialists and cardiac technicians may contribute to the specialist services in centres with a high paediatric or cardiac case mix.

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