



# **Defining and Developing the Interventional Radiology Workforce.**

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## Contributions and Consultation

This document has been developed by the BSIR to highlight the challenges in developing a sufficient number of Interventional Radiologists to support clinical services.

I am grateful to many contributors to this document and in particular Prof Duncan Ettles, Dr Nick Chalmers, Dr Raman Uberoi, Dr Susan Ingram, Dr Steve Goode and Dr Sam Chakraverty.

We are grateful to the RCR for their help with access to the RCR annual survey (2011) and to NHS Improvement for access to the data from the 2011 IR survey.

A draft version of this document was available for comments from members of the BSIR from 11/03/13 to 29/03/13.

A handwritten signature in black ink, appearing to read 'Iain Robertson', with a horizontal line underneath the name.

Iain Robertson

President British Society of Interventional Radiology

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## **1. Executive Summary**

1.1 Interventional Radiology procedures are minimally invasive, targeted treatments performed under imaging guidance. This includes a wide range of procedures extending from treatment of ruptured arterial aneurysms to the treatment of cancer and its complications.

1.2 Interventional Radiology offers vital emergency and elective care; improving patient outcomes and reducing mortality, reducing length of stay and offering greater patient choice.

1.3 Interventional Radiologists are radiologists who have undergone additional specialist training in the practical elements of Interventional Radiology. Within interventional radiology, further subspecialisation is often seen i.e. vascular and non-vascular interventional radiologists.

1.4 It should be recognised that not every interventional radiologist has the same skills. Some continue to specialise in the area of their diagnostic radiology specialty and may not currently possess the range of skills required to provide a complete range of “Out of Hours” treatments.

1.5 The IR subspecialty is facing a major challenge to deliver 24/7/365 services, accommodate very significant increases in the number and complexity of procedures and address an increasing clinical role.

1.6 There is clear recognition of a substantial underprovision of trained Interventional Radiologists that equates to a minimum of approximately 200 FTE posts.

1.7 It is important to remember that this expansion in Interventional Radiology will also provide some diagnostic radiology within most job plans.

1.8 Changes to subspecialty training, essential to progress its quality and consistency, have increased uncertainty about IR training.

1.9 The infrastructure to support IR training requires further development. While the number of Interventional Radiologists intending to complete year 6 training on the Interventional Radiology curriculum is known, there is insufficient data on both the number and skill range of radiologists intending to undertake an IR post with a five year training pathway.

1.10 At present training schemes do not receive specific guidance on the number of IRs required to train an appropriate workforce.

1.11 Local mechanisms to support numbers in IR training are not fulfilling the requirement to expand the number of trainees and meet the needs of clinical services.

1.12 A national process of workforce planning to define a planned number of Interventional Radiologists is required. This should be supported by more detailed analysis of those in training, particularly in the five year non- subspecialty pathway.

1.13 The current vulnerability to year 6 training caused by unclear and variable funding mechanisms should be addressed.

1.14 If, as seems likely, expansion in training is required there is good evidence that training capacity is available within the existing training schemes.

## **2. Introduction**

2.1 The aim of this document is to provide an understanding of the pivotal role of Interventional Radiology in modern healthcare and to highlight the current challenges facing the subspecialty.

2.2 The document uses the limited evidence available to estimate current and predicted workforce and identify the shortfall in numbers of Interventional Radiologists.

2.3 Proposals for a national workforce planning process and changes to training infrastructure are presented.

## **3. The role of interventional radiology in healthcare**

### *3.1 What is interventional radiology?*

Interventional Radiology (IR) is a minimally invasive alternative to open surgery that uses radiological image guidance (fluoroscopy, ultrasound, computed tomography [CT] or magnetic resonance imaging [MRI]) in conjunction with catheters, guidewires and special devices, such as stents, to deliver a wide range of treatments.

### *3.2 What is the impact of an effective IR service?*

Interventional Radiology has a role in almost every area of modern healthcare:

Embolisation: uses catheters, wires and devices to close blood vessels that cause bleeding deep within the body without the need for open surgery. It is life saving in arresting haemorrhage from many causes such as gastro-intestinal bleeding, obstetric or gynaecological bleeding, traumatic bleeding and bleeding after surgery.

Angioplasty & stenting: relieves obstruction in blood vessels and many other tubular structures in the body such as the urinary and gastrointestinal systems without the need for open surgery.

Oncological intervention: treats tumours in the liver, kidneys and other organs using local delivery of chemotherapy, embolisation or ablation techniques (e.g. cryotherapy or radiofrequency ablation).

Working in collaboration with vascular surgeons to deliver minimally invasive treatments of thoracic and abdominal aneurysms. Endovascular abdominal aortic aneurysm repair (EVAR) has revolutionised the management of abdominal aortic aneurysms, reducing both mortality and length of stay associated with this procedure.

Non-vascular interventions: Interventional radiology plays an invaluable role in the palliation and treatment of cancer to relieve obstruction of the biliary, urinary and many other symptoms

3.3 Interventional Radiology delivers significant improvements in patient outcomes in both elective and emergency treatments. Examples include the reduction in mortality and morbidity associated with common emergency conditions such as gastrointestinal bleeding and reduction in mortality and length of stay associated with elective abdominal aneurysm repair.

3.4 Interventional Radiology can offer significant improvements in patient experience and patient safety by offering a reduction in risk compared to more invasive surgical techniques.

3.5 In addition Interventional Radiology can offer significant improvements in efficiency as less invasive techniques offer earlier discharge and therefore reduced bed occupancy.

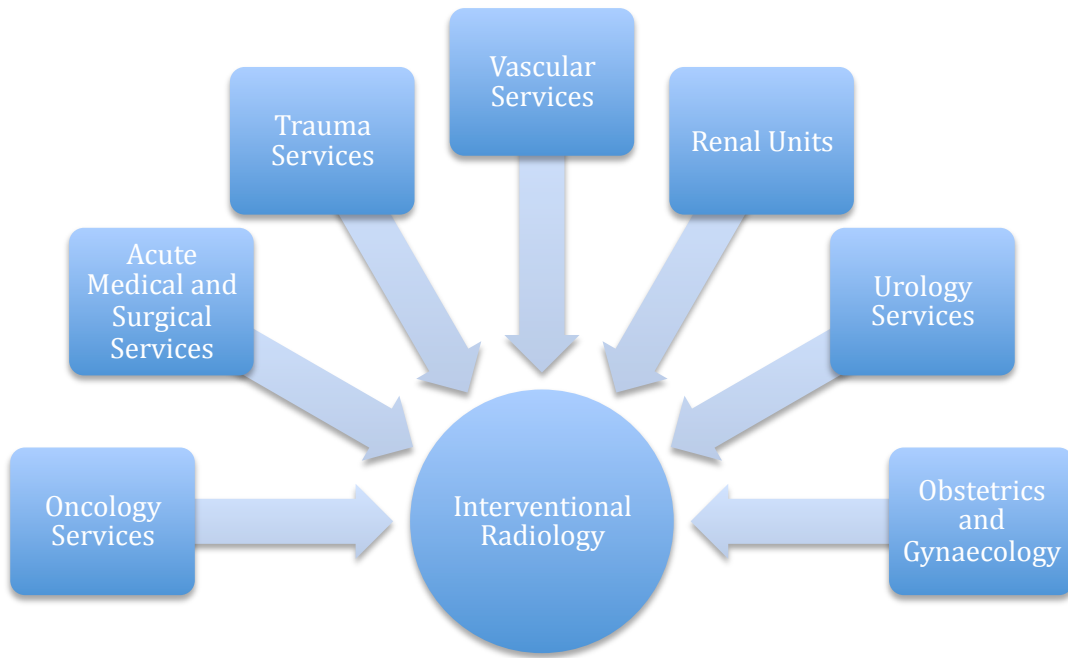


Figure 1: Core NHS activities dependent upon Interventional Radiology.



## **4. The role of the interventional radiologist**

4.1 Interventional Radiologists are radiologists who have undergone additional specialist training in the practical elements of Interventional Radiology.

4.2 Diagnostic radiology remains a vital core element of Interventional Radiology. However, Interventional Radiology practice is significantly different than diagnostic radiology. Interventional Radiology includes additional clinical responsibilities for pre-intervention assessment, consent and follow-up, in addition to a requirement for technical procedural skills.

4.3 Interventional Radiologists provide a broad spectrum of clinical and diagnostic skills. Interventional Radiologists may have a mixed vascular and non-vascular practice; some will focus on vascular procedures, some on exclusively non-vascular areas particularly within specialty areas such as uro-radiological intervention.

4.4 Interventional Radiologists have an increasingly important role to play in the provision of on-call services. Many consultant Interventional Radiologists currently provide on-call services with limited support from junior staff and will be both the first contact and responsible for delivering the procedural care.

4.5 It is important to consider, when planning the provision of Interventional Radiology out of hours services, that a proportion of the total number of Interventional Radiologists will not possess the relevant skills set to provide comprehensive Interventional Radiology OOH cover.

## **5. The case for an increased workforce**

### **5.1 Workload**

5.1.1 The number of interventional radiology procedures has shown a huge rise, increasing by over 50% since 2007. (*Source RCR Workforce document 2012*)

5.1.2 The scope and diversity of Interventional Radiology procedures continues to increase. Some examples include interventional oncology, fibroid embolization, EVAR and FEVAR and renal denervation for hypertension. All of these procedures make significant improvements to patient outcomes and choice offering less invasive, lower morbidity treatment options than conventional surgical techniques.

5.1.3 The role of the interventional radiologist has changed and as a consequence, work patterns must appropriately reflect a more clinical role.

### **5.2 Changes to service delivery: Provision of 24/7/365 IR services**

5.2.1 Interventional Radiology has developed a pivotal role in many acute clinical pathways including embolisation for acute haemorrhage, treatment of vascular surgical emergencies, nephrostomy access for acute renal obstruction and many other vascular and non-vascular emergencies.

5.2.2 The need to improve the delivery and geographical equity of interventional radiology is recognised within the Department of Health White Paper *Equity and Excellence: Liberating the NHS*.

5.2.3 The requirement for an expanded interventional radiology workforce is also evidenced in Regional Networks for Major Trauma, a report by NHS Clinical Advisory Groups recommending 24-hour access to interventional and diagnostic radiology capability.

5.2.4 This is further supported by the Department of Health publication: *Interventional Radiology: Guidance for Service Delivery* and the work of NHS Improvement supported by the BSIR in improving the provision of OOH services for core procedures using a network model.

### **5.3 Working to improve 24/7/365 services**

5.3.1 The Department of Health, NHS Improvement and BSIR have worked together to improve access to IR OOH services.

5.3.2 A key initial step has been the development of a RAG status map for NHS England demonstrating the baseline for IR OOH services.

*Reference: <http://www.improvement.nhs.uk/diagnostics/InterventionalRadiology/IRServiceProvisionMap.aspx>*

5.3.3 The current map demonstrates that 45% of services in England do not currently have either local or network access to IR services out of hours when asked to score service provision against “core” IR OOH services including embolisation for haemorrhage, endovascular, nephrostomy access.

5.3.4 Data from audits of the provision of successful OOH services indicate that the most frequent emergency calls are for embolisation of gastrointestinal haemorrhage and nephrostomy access. These are common conditions received within most acute medical and surgical units in the UK.

5.3.5 A significant factor in failure to provide services remains a shortage of suitably trained Interventional Radiologists.

### **5.4 Anticipated further OOH service developments**

5.4.1 The core procedures are not a complete list of services that may be required for the provision of 24/7 Interventional Radiology.

5.4.2 Complex interventions including EVAR/ TEVAR/ TIPSS were specifically excluded from the production of the RAG maps

5.4.3 There is clearly a need to consider how we will provide complex interventions. This will in part be secondary to the creation of wider area networks that may create further pressures on training and staffing.

5.4.4 Abscess drainage forms part of the core radiology curriculum and is often supplied in a mixed format with both diagnostic and interventional teams depending on variation in skills at individual sites.

5.4.5 There is considerable variation in timely access to abscess drainage. This is a relatively simple procedure and prompt access can make a very significant contribution to patient outcomes.

5.4.6 If future proposals develop an expansion for provision of abscess drainage to IR services this will place very significant pressure on current IR services and require further expansion in numbers.

## **5.5 *Changes to service delivery: Elective service delivery-key specialties***

Interventional radiology supports a number of key and expanding areas of practice.

### **5.5.1 Vascular Intervention**

Interventional radiology plays a pivotal role in the delivery of both peripheral vascular intervention and endovascular aneurysm repair.

There has been a progressive shift from open surgical techniques to catheter based techniques over the past 15 years. Activity in the 2011 IR survey indicates that on average 60 peripheral endovascular procedures per 100,000 population are undertaken (Range 28.9–94 per 100,000 per SHA area).

There is evidence of significant variation in amputation rate and level across the UK, which is thought to reflect variations in access to both surgical and

endovascular techniques. Future quality improvement programmes will focus on improving the delivery of prompt surgical and endovascular treatments for critical limb ischaemia placing increased demands on the IR workforce.

Activity from EVAR from the same survey indicate that on average across England 5.6 cases per 100,000 population are undertaken (Range 3.94- 7.11 per 100,000 per SHA area). Endovascular repair is emerging as a treatment for ruptured aneurysms. A UK randomised controlled trial is in progress and if the results are in favour of EVAR, the establishment of a service for emergency endovascular repair would have a major impact on the need for out of hours interventional vascular radiology.

### **5.5.2. Interventional Oncology**

Interventional Oncology describes a range of vascular and non-vascular procedures, which treat or palliate patients with cancer.

The widespread use of CT and MRI is detecting smaller tumours that can be treated by minimally invasive techniques such as radiofrequency ablation without the morbidity and mortality of conventional surgical treatments.

The use of IR Oncology treatments confer significant benefits to patients in improved outcomes and can convert many previously prolonged hospital admissions to short day case or overnight procedures.

### **5.5.3 Renal Intervention**

Improving renal dialysis provision and maintaining vascular access for dialysis is a major focus for the NHS. Approximately 100 patients per million population start dialysis each year of which 70 will undergo haemodialysis. The most effective and safest form of dialysis is via surgical arteriovenous fistula. Dialysis fistula stenosis or thrombosis occurs frequently, at a rate of about 15 per hundred fistula/years, and radiological intervention is often required to maintain dialysis. Access to prompt fistula intervention remains variable across the UK.

Activity in the 2011 IR survey varied considerably across England with a range of 5.2–18.9/100000 population per SHA area (average 12.5)

It has been estimated that 2 IR sessions are required per 100 dialysis patients.

## **6. Estimating the workforce required to support OOH Interventional Radiology services**

6.1 Estimating the number of Interventional Radiologists required to provide emergency services is a difficult task.

6.2 The CFWI stocktake document outlines an approach based on a 1:5 rota for each acute trust but acknowledges that this does not account for networking between organizations. The document also does not allow for skill variation between Interventional Radiologists that will affect ability to provide on call services.

6.3 An alternative approach is to estimate requirements based on population.

6.4 Sustainable rotas in other specialties delivering direct patient care quote 1:6 as a sustainable rota for populations between 600–800,000

6.5 Calculation for the population for England (2010) would give a requirement of a minimum of 520 Interventional Radiologists across England.

6.6 The 2011 IR survey identified a total of 449 consultant Interventional Radiologists of which 343 could undertake arterial embolization.

6.7 Arterial embolisation represents a vital and core component of IR OOH services and this therefore represents a significant shortfall from the required estimated minimum to provide emergency IR services.

### ***Additional factors***

6.8 As noted above, the IR survey 2011 indicates of a total of 449 radiologists of whom 343 IR were experienced in arterial embolisation ( 343/449 : ratio 0.76). Not all Interventional Radiologists will have the range of skills to support 24/7 services.

6.10 Applying this ratio to the number of Interventional Radiologists required would suggest that the total number of IR required to provide the service would be within the range of 520–700 Interventional Radiologists.

6.11 The application of 1:6 for a population of 600,000-800,000 will depend on the scope of services delivered; a service providing a broad scope of procedures e.g. vascular and non-vascular may have difficulties with long-term sustainability due to work intensity.

6.12 The UK population is not distributed evenly and no correction has been applied for rural environments.

## **7. The current and predicted workforce and shortfall**

### **7.1 *Current workforce: How many Interventional Radiologists are currently in post?***

7.1.1 Interventional radiology became a discrete subspecialty in 2010 with a separate training curriculum

7.1.2 Estimates of the number of Interventional Radiologists across England are available from two sources:

7.1.3 Evidence from the RCR census describes a total of 391 Interventional Radiologists across the UK; England 319, Scotland 39, N Ireland 10, Wales 23. Breakdown of primary interest/ secondary interest/ specialty and age range are available in Figures 2–5.

7.1.4 Analysis is also possible from the NHSI IR survey (2011) which achieved an 85% completion rate across all IR units. This survey collected data of 449 Interventional Radiologists of which 343 could undertake embolization for haemorrhage.

7.1.5 The variation between these figures probably reflects the lack of a uniform definition for an Interventional Radiologist. The construction of the NHSI survey may have collected data for radiologists that included a single area of intervention e.g. renal/ GI.

### **7.2 *Vacancy data***

7.2.1 UK vacancy data in 2010 showed 245 unfilled consultant radiologist posts, equating to 9% of the clinical radiology workforce. Almost half of these posts had been advertised but failed to appoint due to a lack of suitable applicants. A UK study showed clinical radiologists appear to be at greater risk of burn-out than



consultants working in other specialties.

7.2.2 Interventional Radiology is a relatively young specialty and therefore has not to date had to consider a significant number of retirements. The first wave of consultant appointments who started their careers at the advent of Interventional Radiology are now approaching retirement age.

7.2.3 The age profile of expected retirements in the next few years, set against static training numbers, means the gap between workforce supply and demand in interventional radiology is certain to widen (Figure 2–5).

7.2.4 Based on the 2011 RCR census only 6% of the Interventional Radiology workforce is over 55. By 2021 the percentage of the workforce over 55 will have risen to 22%

### **7.3 Predicted workforce: Current training numbers.**

7.3.1 There is currently no national calculation of required training numbers within Interventional Radiology.

7.3.2 Interventional radiology subspecialty training numbers are determined at local deanery level by radiology training programme directors.

7.3.2 The RCR records the number of Interventional Radiologists who intend to undertake 6 year subspecialist training. There is no central record of the number of radiologists who have undertaken training in Interventional Radiology in final years of 5 year training but who will not undertake year 6 training.

7.3.3 There is a mixed pattern of delivery of IR training in schemes

- Ad hoc subspecialty training in yrs 4/5
- Specific IR training posts filled every year by internal selection
- Specific IR training posts filled some years by internal selection

7.3.4 This pattern of delivery is likely to produce future Interventional Radiologists with a variable pattern of skills that may not fulfill requirements for service

provision particularly OOH services.

#### **7.4 Predicted Shortfall**

7.4.1 The CfWI Clinical Radiology Stocktake 2012 identifies an estimated shortfall of 222 FTE to deliver a 1:5 on-call rota for each acute trust.

7.4.2 Sustainable rotas in other specialties delivering direct patient care require 1:6 as a sustainable rota for populations in the region of 600,000- 800,000.

7.4.3 Radiologists support a range of services and therefore calculation based on a 600000 population per 1:6 rota for England population (2010) would give a requirement of approximately 520 IR radiologists across England, assuming that complete networking of service delivery was achievable.

7.4.4 Approximately 343 IR radiologists possess the core skill of embolisation for haemorrhage in the 2011 IR survey, this equates again to a current shortfall of at least 200 IRs across England.

## **8. Closing the gap- proposed solution**

### **8.1 *Defined workforce planning for Interventional Radiology***

8.1.1 Defined specific workforce planning for Interventional Radiology is essential if equity of access to Interventional Radiology is to be delivered.

8.1.2 A nationally coordinated approach to planning and monitoring training numbers in Interventional Radiology should be considered.

8.1.3. This approach would permit a more accurate development and monitoring of the workforce and should ensure closer alignment of training numbers with service needs.

8.1.3 The RCR should consider extending the current system to identify and monitor the total number of Interventional Radiologists in training in both the subspecialty 6 year pathway and for trainees undertaking 5 year training with intention to practice Interventional Radiology.

### **8.2 *Developing an agreed number of IR trainees required for the future***

8.2.1 There is no doubt there is a significant under provision of Interventional radiologists.

8.2.2 A detailed workforce planning exercise is required. However, the following figures may offer initial guidance.

8.2.3 Estimates vary, but there is an approximate underprovision of 200 Interventional Radiologists in the UK.

8.2.4 The RCR holds an accurate number of trainees who are on the CCT with IR pathway. Numbers anticipated are 11 in 2013, 19 in 2014 and 11 in 2015.

This will represent the maximum numbers as some of these trainees may leave the pathway at year 5 if they secure a consultant post or fail to get year 6 funding.

8.2.5 The number of radiologists in training who are not following the subspecialist curriculum but who plan to complete a more limited spectrum of IR training completing in year 5 is not known. (non-subspecialty IR).

8.2.6 In order to provide a trained sustainable workforce for the provision of OOH IR services a minimum workforce of circa 700 IRs across the UK is required (to allow for variation in skills).

8.2.7 To permit expansion of the workforce based on an estimated requirement of 520- 700 Interventional Radiologists by 2025 a provisional estimated requirement of a minimum of 45-50 Interventional Radiologists in training in each year is needed.

### **8.3 *Developing the current training programmes***

8.3.1 A nationally controlled process for IR training should assess IR training capacity across the UK.

8.3.3 A variety of training pathways in Interventional Radiology are currently in use. Some trainees are completing a 5 year training programme with specific IR competencies; these trainees will have varying competencies but will not have completed the breadth of the IR curriculum. Trainees within the IR subspecialist curriculum will have completed a 3 year training programme (Year 4–6) and will have experience across the breadth of the IR curriculum.

8.3.4 The BSIR training survey indicates that the majority of trainees (72%) completing year 6 intend to undertake a vascular IR consultant post. Trainees in year 5 training show a majority intending to undertake a general IR post (66%). Further details of the range of vascular/ non-vascular skills in year 5 are not available.

8.3.5 The range of skills within the non-subspecialty IR group is not currently recorded.

8.3.6 Consideration should be given to ensure that all training pathways in IR provide core IR procedural skills to ensure support of IR OOH services (eg embolisation, nephrostomy).

8.3.7 A major difficulty for training programme directors remains funding of Year 6 training; this is currently achieved by a variety of mechanisms including displacement of funding from year 1 training, use of funding from other displaced specialties and more rarely by formal business case. This pattern of funding is vulnerable and unsustainable and clear guidance is required to ensure the sustainability of IR training posts.

8.3.8 The BSIR training survey (2012) indicates that interest in Interventional Radiology amongst trainees remains high.

8.3.9 Evidence from the BSIR training survey 2012 indicates given funding additional training capacity is available; 27 schemes have the training resource to train the full 6 year IR curriculum.

#### **8.4 *Improving use of training capacity***

8.4.1. Prior to the adoption of subspecialist training in 2010, a number of training schemes maintained IR fellowships that permitted specialist training. These schemes have largely been discontinued.

8.4.2 At present, there is a significant risk that trainees within a local scheme that is over-subscribed with trainees interested in Interventional Radiology, will not have an opportunity to undertake IR training

8.4.3 A nationally coordinated process would ensure that schemes that have the

capacity to undertake Interventional Radiology training could “advertise” vacant training posts in IR making better use of capacity. Entry to these schemes would be at ST4.

8.4.4 An appropriate mechanism to permit inter-deanery transfer that would support this scheme and determine the models of funding should be developed.

## **9. Risks if action is not taken.**

9.1 Interventional Radiology offers vital emergency and elective care.

9.2 The subspeciality is currently undergoing a transition from a service that was provided in only a small number of sites to a robust service available across the UK.

9.3 Many services are currently under intense pressure and emergency cover is delivered by rotas that are unsustainable.

9.4 A continued shortfall will be damaging to both elective and emergency patient care and outcomes and impair recruitment to Interventional Radiology.

9.5 Given the severity of the challenge a national programme of workforce planning supported by a national process for training offers the greatest security of delivering the future workforce.

## **10 Conclusions**

10.1 Interventional Radiology offers vital emergency and elective care; improving patient outcomes, reducing length of stay and offering patient choice.

10.2 The subspecialty is facing a major challenge to deliver 24/7/365 services, accommodate very significant increases in number and complexity of procedures and an increasing clinical role.

10.3 There is clear recognition of a substantial under provision of trained Interventional Radiologists; circa 200 FTE posts.

10.4 Changes to subspecialty training, essential to progress the quality and consistency of Interventional Radiology training, have increased uncertainty about Interventional Radiology training.

10.5 There are gaps in knowledge on the number of Interventional Radiologists in training and the skill range within those trained. Data on the training of non-subspecialty Interventional Radiology trainees is required to ensure accurate workforce planning.

10.6 Training schemes do not receive specific guidance on allocation of respective training numbers in diagnostic and interventional radiology which may impede future planning.

10.7 Local mechanisms to determine numbers in Interventional Radiology training are not fulfilling the requirement to expand the number of Interventional Radiologists in training.

10.8 A national process of workforce planning is required to ensure an appropriate number of Interventional Radiologists with skills to support emergency and elective services is being trained.



10.9 The introduction of a nationally coordinated process could help to ensure that schemes which have the capacity to undertake Interventional Radiology training could "advertise" vacant training posts in Interventional Radiology making better use of capacity. Entry to these schemes would be at ST4. Further work to determine models of funding would have to be developed

10.10 This mechanism should also address the current vulnerability to year 6 training caused by unclear and variable funding mechanisms.

10.11 If, as seems likely, expansion in training is required there is good evidence that training capacity exists within the schemes.

## Charts

Figure 2: 2011 RCR census data for England. Total number of IR 319; General and primary interest 202, general and secondary interest 40, specialist 77.

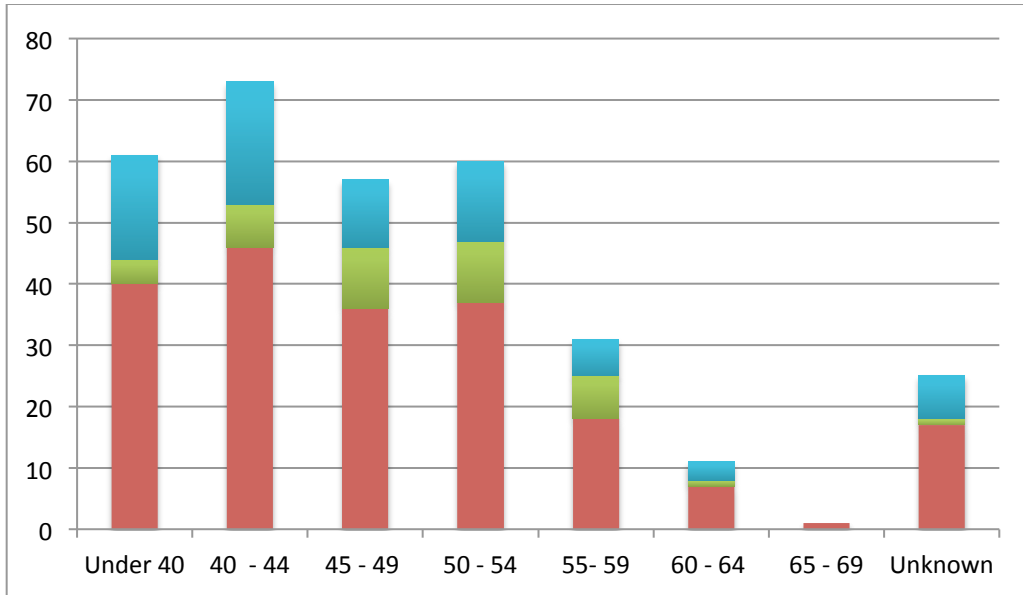


Figure 3: 2011 RCR census data for Scotland. Total number of IR 39; General and primary interest 32, general and secondary interest 5, specialist 2.

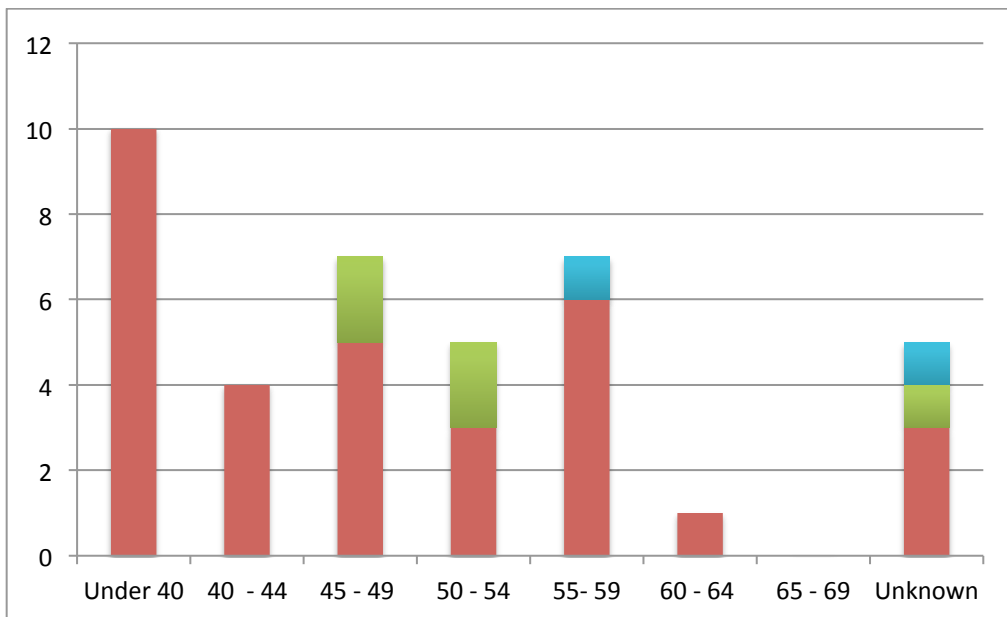


Figure 4: 2011 RCR census data for N Ireland Total number of IR 10; General and primary interest 6, general and secondary interest 3, specialist 1.

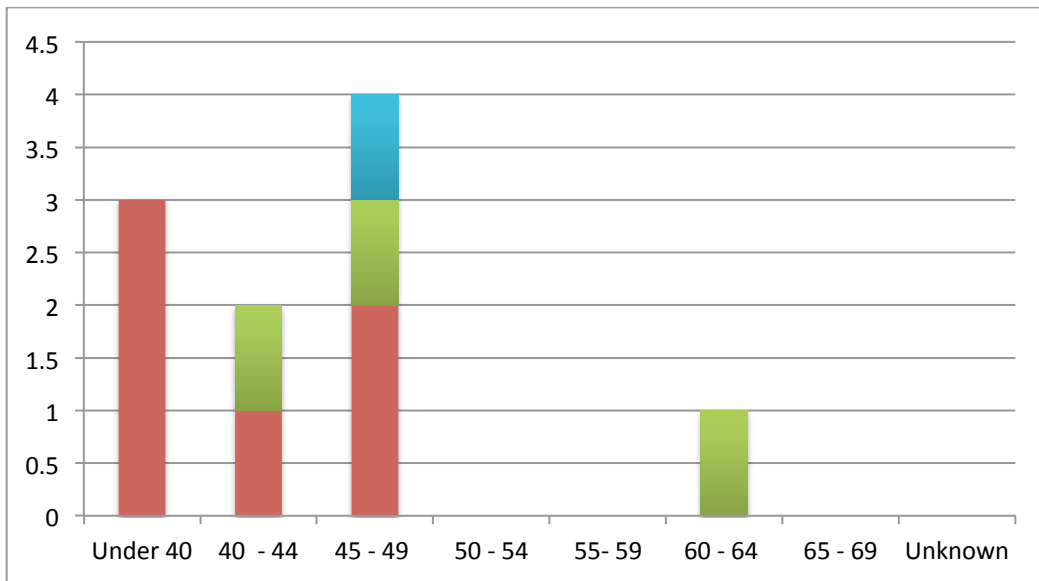
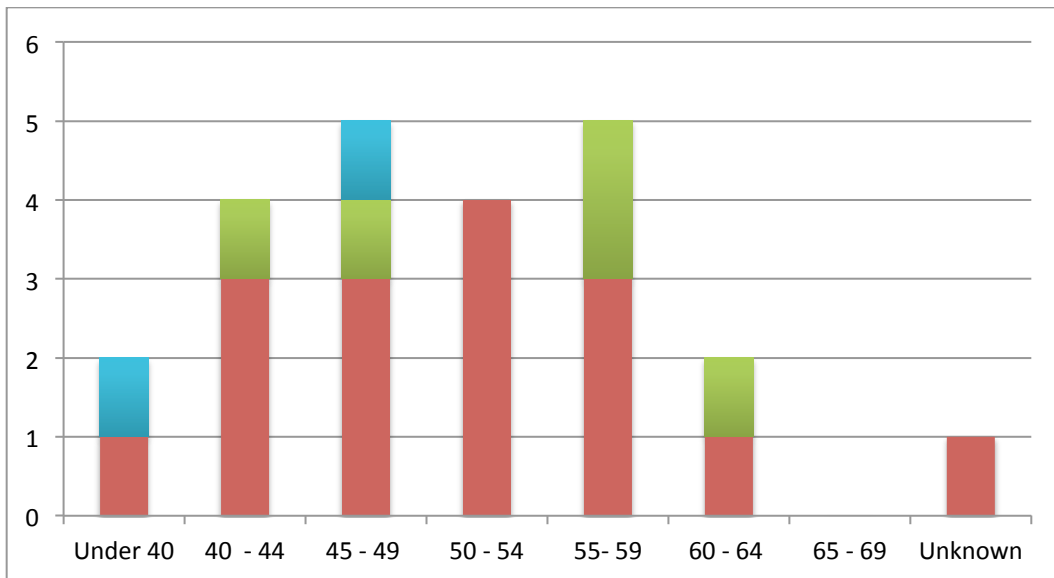


Figure 5 : 2011 RCR census data for Wales Total number of IR 23; General and primary interest 16, general and secondary interest 5, specialist 2.



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NHS Improvement

<http://www.improvement.nhs.uk/diagnostics/InterventionalRadiology.asp>