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REVIEW ARTICLE

Interventional radiology training: a comparison of 5 English-speaking countries

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Objective: To compare key characteristics of interventional radiology (IR) training in the UK with four other English-speaking countries (USA, Canada, Australia and New Zealand) and summarise requirements for training.

Methods: Main features examined were career pathway and requirements, examinations required, specific competition for IR and the process of applying for training as an international medical graduate. Data were collected from official governing body publications, literature and personal experience.

Results: Several differences were highlighted, including length of training (ranging from 6 to 9 years after

medical school), length of IR-specific training (ranging from 1 to 3 years) and examinations required (USA and Canada have additional IR-specific examinations). The level of competition is generally high, in all countries.

Conclusions: With the demand for IR services set to increase over the next few years, it is crucial that more IR specialists are trained to meet this demand. Awareness of training structures in other countries can highlight opportunity and pitfalls, and help ensure the number of highly trained interventional radiologists in the UK continues to grow.

INTRODUCTION

Since Dotter's first proposed percutaneous angioplasty in 1964, interventional radiology (IR) has flourished into a broad specialty that now lies at the heart of modern medical practice. Constant innovation in device and imaging technology has allowed image-guided techniques to transform patient care in almost every field, offering lower morbidity, minimally invasive treatment options. Recent examples include prostate artery embolisation for benign prostatic hyperplasia, thermal ablation for treatment of focal cancers and carotid artery stenting for carotid artery stenosis.¹

Radiologists, once viewed as only performing diagnostic image interpretation, can now lead delivery of complex patient care, resulting in IR becoming a distinct clinical specialty—although the recognition of this varies across different countries. With the demand for IR procedures continuing to rise significantly,² it is crucial that more IR specialists are trained to meet this demand for services. A working group for the UK's Royal College of Radiologist and British Society of Interventional Radiologists estimated a current 30% shortage in IR consultants in the UK, and

that nearly half (45%) of services in England were unable to support either a local or networked out-of-hours IR service.³

The aim of this review was to compare the postgraduate training pathway in IR in countries with well-developed healthcare systems, including the UK, the USA, Canada, Australia and New Zealand. Our selection of countries was primarily based on their reputation of having high-quality training and their popularity amongst current and recently completed trainees. The purpose of this study was to highlight the main similarities and differences across training programmes, and set out the key entry requirements for trainees considering a career in IR.

METHODS AND MATERIALS

The key features examined were the training pathways, duration of training, the curricula of the training programmes and the governing body's examinations required for completion of training. Data were collected from literature, online resources and from publicly available, official governing bodies' documents.

Table 1. Outline of the career pathway in each country

Country	UK	USA	CANADA	AUSTRALIA & NEW ZEALAND
Qualification name	CCT in Clinical Radiology with Subspecialisation in IR	ABR Board Certification in DR & IR	Royal College Certification in DR & Royal College Certification in IR	FRANZCR & IRSA/CCINR Credentials
PG Years	FY1	Internship	PGY1 Basic Clinical Year	Internship
	FY2	PGY2 DR	PGY2 DR	Internship (NZ) Residency (Aus)
	ST1 in DR	PGY3 DR	PGY3 DR	Year 1 Radiology
	ST2 in DR	PGY4 in DR	PGY4 DR	Year 2 Radiology
	ST3 in DR	PGY5 in IR	PGY5 DR	Year 3 Radiology
	ST4 in IR	PGY6 in IR	PGY6 IR Fellowship	Year 4 Radiology
	ST5 in IR		PGY7 IR Fellowship (dependent on previous exp.)	Year 5 Radiology
	ST6 in IR			IR or INR Fellowship
				INR Fellowship

ABR, American Board of Radiology; CCINR, Conjoint Committee for Recognition of Training in Interventional Neuroradiology; CCT, Certificate of Completion of Training; DR, Diagnostic Radiology; FRANZCR, Fellowship of the Royal Australian and New Zealand College of Radiologist; INR, Interventional Neuroradiology; IR, Interventional Radiology; IRSA, Interventional Radiology Society of Australasia; PG, Postgraduate.

RESULTS

See [Table 1](#) for an outline of the training pathway in each country. See [Table 2](#) for a comparison of key features. These are summarised below.

Training in United Kingdom

IR has been recognised by the General Medical Council (GMC) Specialist Training Authority as a distinct subspecialty of radiology since 2010. The training pathway in the UK leads to the award of a Certificate of Completion of Training (CCT) in Clinical Radiology with Interventional Radiology Subspecialisation.

Training pathway

The training pathway requires newly qualified doctors to complete a two-year foundation programme (FY1 and FY2) before competitively applying for a national training number (NTN) in their desired specialty. Full GMC registration is granted after the FY1 year. Applicants wishing to pursue IR (or any other subspecialty of radiology) must obtain an NTN for clinical radiology first. Once enrolled on the clinical radiology programme, trainees must complete core radiology training for 3 years (ST1–ST3) before entering IR as their higher training subspecialty. IR trainees complete 3 years (ST4–ST6) of training, choosing to either develop skills in a vascular and non-vascular IR programme, or in diagnostic and interventional neuroradiology. The total duration is 8 years after medical school. Trainees can opt for optional further training in the form of a fellowship, although this experience is not counted as part of the CCT. Many trainees opt for a fellowship abroad, with the USA, Canada and Australia as common destinations. Fellowships are commonly done for a variety of reasons, including pursuing an area of special interest, gaining more experience before becoming a consultant or to improve job prospects in a specific location or subspecialty. For example, undertaking a paediatric IR fellowship would increase

the likelihood of being considered for a position in a specialist paediatric hospital.

Competition

Competition for entry into clinical radiology is high and has increased in recent years. In 2018, there were 3.75 applications for every ST1 post; only five other specialties offered at the ST1 level had a higher ratio.⁴ Competition for IR specifically is difficult to determine, as recruitment is conducted on a local basis. However, the majority of trainees that express desire to train in IR are able to find a position.

Training requirements

Training requirements involve three main strands—examinations, competencies and research. All radiology trainees must complete common Fellowship of the Royal College of Radiologists (FRCR) exams, regardless of the subspecialty pursued. Each part of the exam must be completed by a stated deadline—first FRCR by ST1, final FRCR part A by ST3 and final FRCR part B by ST4. There is no specific exam for IR, although many trainees will take the voluntary supplemental European Board of Interventional Radiology examination.⁵ IR trainees must also gain competencies, and it is their responsibility to maintain an electronic portfolio of workplace-based assessments (WBPA) in key competencies and ensure that they meet the requirements set out by the RCR. A minimum of 12 observed encounters are required per year, although trainees typically undertake more.⁶ The WBPA additionally include quality improvement projects and observation of teaching. Radiation protection training is usually incorporated in the training scheme and can include both informal training and courses. Understanding of these topics are assessed in the FRCR examinations. One research project also must be completed, although this can be at any point in the 6-year training period.⁶ IR procedures are split into level 1 and

Table 2. A comparison of key features in each country

	UK	USA	CAN	AUS	NZ
Qualification body	GMC	ABR	RCPSC	RANZCR	RANZCR
Qualification Name	CCT in Clinical Radiology with subspec. Interventional radiology	Board Dual Certificate in DR/IR	RC cert in DR RC cert in IR	FRANZCR	FRANZCR
Organisation developing curriculum	RCR	ACGME	RCPSC	RANZCR and IRSA	RANZCR and IRSA
Additional IR organisations in the country	BSIR	SIR	CAIR	CCINR, IRSA	CCINR, IRSA
Number of IR consultants	596	3416	172	259	23
Min. PG Years of training	8	6	6-7	8-9	8-9
Years of radiology (IR)	6 (3)	5 (2)	6-7(2)	6-7 (1-2)	[td]
Number of IR Training positions per year	Dependent on local provision	150 Residency 219 fellowships	30-35 fellowships	eleven fellowships	2-3 fellowships
Exams <i>Not including licencing exams</i>	First FRCR (by end of ST1) Final FRCR part A (by end of ST3) Final FRCR part B (by end of ST4)	ABR Core Exam (after 36 months) ABR IR/DR certifying exam (at end of residency)	RC exam in DR (during DR residency) RC exam in IR (during IR fellowship)	FRANZCR part 1 (by end of year 2) FRANZCR part 2 (after end of year 3)	FRANZCR part 1 (by end of year 2) FRANZCR part 2 (after end of year 3)
Research requirements	Undertake one project.	Undertake one project. Must publish or present it.	Undertake one project relevant to IR.	Demonstrates interest and commitment to research	Demonstrates interest and commitment to research
Duty hours (max)	56 h/week (48 if EWTD)	80 h/week	Not specified	Not specified	Not specified
Procedure numbers in training	Not specified	1000	Not specified	430	430

ABR, American Board of Radiology; ACGME, Accreditation Council for Graduate Medical Education; CCT, Certificate of Completion of Training; DR, Diagnostic Radiology; EWTD, European Working Time Directive; FRANZCR, Fellowship of the Royal Australian and New Zealand College of Radiologists; FRCR, Fellow of the Royal College of Radiologists; GMC, General Medical Council; IR, Interventional Radiology; IRSA, Interventional Radiology Society of Australasia; PG, Postgraduate; RANZCR, Royal Australian and New Zealand College of Radiologists; RCPSC, Royal College of Physicians and Surgeons of Canada; RCR, Royal College of Radiologists.

level 2 procedures. Level 1 procedures include biopsy, drainage and nephrostomies, and these are part of the core curriculum for all radiology trainees. Level 2 procedures are more advanced, and competence is acquired during IR training years. It is not absolutely necessary to have a CCT with IR subspecialisation in order to practice advanced procedures,⁷ as long as the consultant has acquired competence during training, and many consultant interventional radiologists in the UK do not have IR subspecialisation listed on their CCT, having trained prior to the recognition of IR subspecialty status. However most, if not all, new trainees will follow the current IR curriculum and obtain IR subspecialisation on their CCT.

Moving to the UK

Applying for training as an international medical graduate (IMG) first requires gaining full GMC registration. This requires completion of the Professional and Linguistic Assessments Board (PLAB) examination, as well as clinical experience. This experience must be 12 months of internship experience immediately after graduation, or 2 years continuous experience not necessarily immediately after graduation. After gaining registration, IMGs can then apply for a standalone FY2 post, after which they can begin specialty training.

International IR trainees looking for a fellowship position in the UK must have full GMC registration as well as a total of 5 years of radiology experience equivalent to that of a UK trainee.

IRs who have completed training elsewhere can apply to receive a Certificate of Eligibility for Specialist Registration (CESR), which is viewed as equivalent to a CCT in Radiology with subspecialisation in IR. A CESR provides an exemption from the PLAB exam. Applicants need to submit a portfolio showing equivalency in many different domains, including but not limited to knowledge, professional attributes, research and audit. Data for CESRs in clinical radiology as a whole are available from the GMC website but not specific data regarding clinical radiology with IR. In 2017, there were a total of 32 applications for CESRs, 25 of which were successful (71% success rate).⁸

Training in the United States

The USA is the only country in our study where candidates apply separately for IR. In 2012, the Accreditation Council for Graduate Medical Education (ACGME) acknowledged IR as a specialty distinct from diagnostic radiology (DR) and approved the independent DR/IR residency in 2015. The ACGME sets out training requirements for training programmes, and the American Board of Radiology (ABR) provides a dual IR/DR certificate.

Training pathway

The training pathway after medical school begins with a 1-year internship programme in internal medicine, general surgery or a rotational programme. Following this, the graduate completes a 5-year integrated IR/DR residency, which includes 3 years of DR and 2 years of IR. The total length of postgraduate training is 6 years. An alternative independent IR residency is available for trainees who have already completed a 4-year DR residency. The residency intends to replace existing IR fellowships and will begin in 2020. This is a 2-year residency, but can be shortened to

1 year if the trainee's previous DR residency has provided early specialisation in IR (ESIR). The total time spent in postgraduate training is 7 years, but shortened to 6 years in ESIR programmes.

Competition

Competition is extremely high, with IR being the most competitive residency. Applications for both the internship and the integrated IR residency are conducted through the National Resident Matching Process (NRMP). Positions are either offered in conjunction with an internship (categorical) or without an internship (advanced). The NRMP match for IR is an extremely competitive process. There were 253 applicants for a total of 136 positions, providing a ratio of 1.86, the highest for any specialty by far.⁹ The average United States Medical Licensing Examination (USMLE) Step one score is a reliable indicator of the level of competition for a residency. For a matched IR applicant, the mean USMLE Step 1 score was 248, significantly higher than the national average-mean 232.8, standard deviation 17.5. It is currently not known how competitive the independent residencies will be, although a recent survey of department chairs suggests that programmes will not be able to accommodate all ESIR DR residents in years of high competition.¹⁰

Training requirements

Training requirements involve three main strands—examinations, competencies and research. The ABR Core examination must be completed in the first 36 months of residency—this is common to DR and IR. Candidates must also pass the ABR IR/DR certifying exam in order to become board-certified. Although board certification is a voluntary process, almost all trainees opt to become board-certified. Competencies include the completion of 1000 procedures, with a combination of vascular and non-vascular works. However, it is the responsibility of the residency programme to ensure adequate exposure. There is also a requirement for residency programmes to provide training on radiation safety, and this content is on the syllabus for both the core and certifying examinations for IR/DR. A research project must be completed, and this must be published or presented.¹¹ For independent practice, trainees must also gain licensure, which involves completion of the USMLE steps 1, 2 and 3 examinations. USA trainees typically complete USMLE steps 1 and 2 during medical school, and step 3 during the internship year.

Moving to the USA

Applying for training as an IMG requires Educational Commission For Foreign Medical Graduates (ECFMG) certification. This requires completion of the USMLE steps 1 and 2, as well as graduation from medical school. ECFMG certification allows an applicant to enter the NRMP match and apply for programmes as would an USA graduate. However, the match rate for IMGs is lower than for local graduates, and applicants generally require higher USMLE step one scores than USA graduates. Additionally, local clinical experience and local letters of recommendation significantly strengthen a residency application, and obtaining these are the major hurdles that IMGs face. In 2018, only one person who matched into IR was not a USA applicant.¹² The NRMP sponsors a J1 visa for the applicant, which requires an applicant to return to their home country for 2 years after residency. An H1b visa avoids this requirement, although this is not

sponsored by the NRMP, involves more legal and administrative effort, and requires completion of the USMLE Step 3.

Applying for a fellowship in the USA as an IMG IR trainee is extremely difficult and is the hardest out of the five countries studied. Due to the implementation of the IR residency, fellowship opportunities are extremely limited. IR fellowships have been replaced by the independent IR residency, and this requires completion of a DR residency in the USA. Therefore, fellowship opportunities for IMG IR trainees are limited to non-accredited positions that are organised at a local level.

IRs who are certified to practice IR in another country can apply through the ABR alternate pathway for IMGs.¹³ The alternate pathway requires completion of an additional 5 years of continuous training in an ACGME-accredited programme, in addition to completing the ABR core exam and IR/DR certifying exam. This is essentially completing the same number of years as a residency, although an applicant would not have to apply for a residency through the NRMP—an institution can sponsor their application.

Training in Canada

In Canada, IR has been recognised as a subspecialty of DR since 2013. The Royal College of Physicians and Surgeons of Canada (RCPSC) develops the curriculum and provides certification in IR. It is projected to be a shortage of IRs in Canada, with 78% of departments predicting shortages.¹⁴

Training pathway

Medical graduates must first complete a 5-year DR residency. Candidates enter directly into a DR residency after graduation. Medical graduates apply for a residency through the Canadian Resident Matching Service (CaRMS). However, the first year of residency programmes involves rotations in different specialties, making it similar in content to an internship in the USA. After becoming RCPSC certified in DR, candidates must undertake a further 2 years of IR training. This can be shortened to 1 year if the candidate has completed enough IR during the DR residency (paralleling the ESIR designation in the USA). Overall, there is a minimum of 6 years postgraduate training.

Competition

Competition for DR in Canada is relatively low compared to other specialties and competition has been declining since 2012. This is unlike what has been observed in the UK and USA. Places are offered separately for Canadian Medical Graduates (CMGs) and IMGs. In 2018, there were 115 applicants for 83 CMG positions (ratio 1.39).¹⁵

Training requirements

Training requirements in the DR residency include the RCPSC certifying exam in DR and completion of a research project relevant to DR.¹⁶ Requirements in the IR years include acquiring IR competencies, completing the RCPSC certifying exam in IR and completion of a research project relevant to IR.¹⁷ Trainees must also obtain a licence in order to practice independently, which includes fulfilling requirements of provincial regulatory

authorities and completing the Medical Council of Canada Qualifying Examination (MCCQE) Parts I and II.

Moving to Canada

Applying to residency as an IMG is an extremely tough process for IMGs, and possibly the hardest out of all the countries we have examined. In order to apply for a Canadian residency, a candidate must have Canadian citizenship or permanent residency. IMGs must also pass the National Assessment Collaboration (NAC) examination, and complete the MCCQE Part I examination. Additionally, there are separate quotas for IMGs in the residency programmes. This has made the match rate for IMGs in Canada far lower than the USA. In 2018 CaRMS match, there were 106 applications for five DR positions.¹⁵

Applying for a Canadian IR fellowship as an IMG is highly competitive, although more accessible to an international trainee compared to the USA. Fellowship positions require completion of training equivalent to the Canada but are open to international trainees without requiring completion of the MCCQE examinations, making it a highly attractive choice for trainees across the world.

IMGs that have completed IR training outside the USA or Canada can have their training approved by the RCPSC through the 'approved-jurisdiction route'. The UK, Australia and New Zealand are all approved jurisdictions. Following a successful application for a review of training, applicants become Royal College certified in DR following completion of the certifying examination. The candidate would then have to complete an IR fellowship and examination in order to be Royal College certified in IR.

Training in Australia

Australia recognises IR and interventional neuroradiology (INR) as subspecialties of radiology. The Royal Australian and New Zealand College of Radiologists (RANZCR) accredits radiology trainees, and the IR Society of Australasia (IRSA) and Conjoint Committee for Recognition of Training in Interventional Neuroradiology (CCINR) are separate bodies that provide recognition of further training in IR and INR, respectively. IR has been recognised as an area of radiology that is undersupplied.¹⁸

Training pathway

Medical graduates must complete an internship (1 year) and a residency (minimum 1 year) before entering specialty training. Candidates must then complete a 5-year training programme in clinical radiology in order to obtain fellowship of the college (FRANZCR) and entry to the specialist register. At this point, candidates can choose to undertake further training in IR in order to apply for IRSA or CCINR credentials. IR requires 1 year of training at an approved site, whereas INR requires 2 years.

Competition

Competition is difficult to measure objectively, as there is no national application process for radiology programmes or for IR training. However, anecdotal evidence suggests that competition is high for a training position in radiology.¹⁹

Training requirements

Training requirements in the 5-year radiology programme include completion of the part one exam by the end of year 2, and the part two exam by the end of year 5. Competencies must be acquired as stated in the curriculum. Radiation protection is a core topic examined on the FRANZCR examination. Additionally, the programme requires completion of two projects, one of which must include a literature search component. Requirements for IR certification include completion of training at an approved site, as well as a minimum number of specific procedures, totalling 430.²⁰ Requirements for INR credentialing include 2 years of training, as well as complete a minimum number of specific procedures. A total of 140 cases are required, plus an unspecified number of experience in others.²¹ The IRSA defines IR procedures in two tiers. Tier A procedures can be performed by anyone with FRANZCR and include biopsies, angiography and nephrostomy. Tier B procedures, for example, neurointervention or vascular intervention, require credentialing, and as of 2016, no general radiologists performed 'advanced' IR procedures.¹⁸

Moving to Australia

Applying for training as an IMG varies depending on the country of qualification. Applicants from certain countries are eligible to apply for provisional registration with the medical board of Australia through the competent authority pathway. Graduates from medical schools in the USA, Canada, UK and New Zealand are all eligible through this pathway. Provisional registration requires at least 1 year of postgraduate training to be completed in that country, although this varies by country. It also requires completion of examinations in the home country. After getting this provisional registration, IMGs must complete a 12-month practice period (equivalent to an internship) to gain general registration, after which they can start residency and then their specialty training.

Australia is a popular destination for IR trainees seeking additional fellowship training abroad. Trainees within 2 years of completing training who secure a fellowship position in Australia can either apply for limited registration for postgraduate training or provisional registration if they meet the requirements of the competent authority pathway.²²

Radiologists who have been certified in other countries wishing to practice in Australia can apply to the Medical Board of Australia through the specialist pathway.²³ The RANZCR assesses the applicant for comparability to an Australasian colleague. If deemed 'substantially comparable', specialist registration is granted after a 12 month of peer-reviewed practice. If deemed 'partially comparable', applicants are required to complete the Phase 2 radiology examinations, plus undertake additional training decided on a case-by-case basis. The overwhelming majority of successful applicants are deemed 'partially comparable'. In 2017, 57 applications were made to the RANZCR, resulting in 1 'substantially comparable', 35 'partially comparable' applicants, and 18 'partially comparable' applicants that required further training prior to the Phase two examinations.²⁴

Training in New Zealand

Radiology training in New Zealand (NZ) follows the structure in Australia.

The training pathway begins with a 2-year internship (PGY1 and PGY2), which grants a trainee general registration with the Medical Council of NZ (MCNZ). After this, trainees can enter a training post and achieve FRANZCR, followed by further training to achieve credentials from the IRSA or the CCINR. The main difference is that recruitment for specialty training posts in NZ is conducted at a national level by the NZ branch of the RANZCR. Applications are assessed and strong applicants are interviewed and then ranked in order of merit. These candidates are then matched to programmes.

Competition

Competition is high for radiology jobs in NZ. In 2017, there were 47 applicants and 17 were selected (ratio 2.76).²⁵

Moving to New Zealand

IMGs looking to apply for training must first gain provisional registration. This can be done by graduating with a UK degree and completing the FY1 year (competent authority pathway), working in a comparable health system (including USA, Canada and many European countries) for 2 years (comparable health system pathway) or passing the NZREX clinical examination. Following provisional registration, candidates must complete further training (6–12 months) to gain general registration with the MCNZ. After which they may apply for specialty training. Applicants must also hold citizenship or permanent residency in order to apply for clinical radiology training in NZ.

IR trainees looking for fellowship positions in NZ require special purpose postgraduate training registration from the MCNZ.²⁶ Although this is open to international graduates, there are very few IR fellowship positions in NZ. Difficulty in finding a suitable position makes it a less popular choice among international trainees looking for further fellowship training.

IR consultants practising in other countries can apply to have their training reviewed by the MCNZ. If this is comparable to that of a local practitioner, the applicant is granted provisional vocational registration. In order to achieve vocational registration, and practice as a consultant, an applicant then must either complete 6–12 months of supervised practice, or 12–18 months of supervised practice with additional assessment, as determined by the MCNZ.²⁷ In the field of diagnostic and IR, for the year July 2016–June 2017, a total of 38 doctors were awarded a vocational scope of practice, 23 of whom were from overseas.²⁸ Additionally, after receiving vocational registration, candidates would need to apply for RANZCR fellowship status. The process is largely similar to the RANZCR assess whether the candidate is comparable to a NZ fellow.

DISCUSSION

The shortage of IR consultants in the UK is significant. There is currently an estimated shortfall of 222 interventional radiologists,²⁹ with insufficient training positions nationally to fill these posts. This issue is set to grow in the future as demand for

IR services increases, such as 24/7 mechanical thrombectomy services, which have the potential to benefit over 8000 eligible patients per year.³⁰

This review highlights the key features of IR training in the UK, USA, Canada, Australia and NZ. Generally speaking, competition for radiology training is high, particularly in the UK and USA. IR is a growing specialty, and although similarities exist between countries, there are differences in training structure and certification guidelines. All countries have recognised the increasing complexity of IR procedures and have established credentialing guidelines in order to ensure good practice.

The length of overall postgraduate training varies significantly between countries. The USA and Canada have a shorter training period (minimum 6 years) compared to the UK, Australia and NZ (minimum 8 years). The UK has the longest length of IR-specific training (3 years), compared to 2 years in the USA and Canada, and 1 year in Australia and New Zealand. There is also variation in training requirements across countries. All countries require completion of general radiology examinations, but the USA and Canada are unique in that they have IR-specific certification exams. All countries require completion of research project, although the USA stipulates an added requirement for publication or presentation of this research work.

The ease of moving between countries varies considerably, and this is dependent on the level of the applicant. The USA is particularly difficult for an IR consultant, as even fully certified interventional radiologists must still undertake many years of additional training before independent practice. Canada is

particularly difficult for obtaining a training position due to the requirement for Canadian citizenship or permanent residency, as well as separate quotas for IMGs.

The issue of radiation protection training is important to consider, as increasing use of IR procedures means greater exposure to ionising radiation, both for patients and staff. Manufacturers are constantly developing new features to reduce exposure, for example improved beam filtration, high sensitivity detectors and virtual imaging. The basics of radiation protection training are incorporated into all radiology training programmes, but there is a lack of specific IR training in the area. It is important that all trainees take an active interest in technology advances and ensure both personal and patient exposure is as low as possible.

Our review does have some limitations. First, we have limited our analysis to a select few countries. There are many other countries with high-quality IR training programmes. Second, we aim to compare IR training in general, but do not cover subspecialty areas of interest. Additional work should be done to compare the status of major IR subspecialty areas, including paediatric IR and neuro IR.

CONCLUSION

Awareness of training structures in other countries can highlight key similarities and differences, and ensure that the UK continues to provide high-quality training in IR. Establishing a world-leading training programme will allow enhanced provision of local IR services, as well as attracting trainees from across the world.

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