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FULL PAPER

A national UK survey of radiology trainees special interest choices: what and why?

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Objectives: A national survey was designed to better understand factors influencing special interest choices, future aspirations of UK radiology trainees and perceptions of breast radiology.

Methods: A SurveyMonkey questionnaire was developed and distributed to all radiology trainees in the UK through the British Institute of Radiology, RCR Junior Radiologists Forum and by directly contacting UK training schemes as well as by social media between December 2015 and January 2016.

Results: From 21 training schemes across the UK, 232 responses were received. Over half entered radiology after foundation training and 62% were ST1-3; one-fifth of trainees intended to leave the NHS. The most popular special interests were musculoskeletal (18%), abdominal imaging (16%) and neuroradiology (13%). Gynaecological and oncological imaging proved to be the least popular. Strong personal interest, a successful rotation

during training, a mix of imaging modalities, direct impact on patient care and job prospects were the most popular factors influencing career choice. Research and potential for private income were the least influential factors.

Respondents detailed their perceptions of breast radiology, selecting an awareness of career prospects (41%) and a better trainee experience (36%) as factors that would increase their interest in pursuing it as a career.

Conclusion: Understanding the factors that influence special interest choice is essential to addressing the alarming staffing shortfalls that will befall certain radiology special interests. Addressing trainee's preconceptions and improving the trainee experience are key to attracting trainees to breast radiology.

Advances in knowledge: This is the first survey of its kind in the UK literature designed to evaluate special interest career choices and the factors that influence those among radiology trainees.

INTRODUCTION

The Royal College of Radiologists (RCR) Workforce census reports in recent years have heralded the staffing challenges facing radiology posed by threats of staff recruitment, retention and retirement.¹ There is a recognized shortage of radiologists and shrinkage of the workforce in the UK, which already has fewer radiologists than many European countries, with 7 trained radiologists per 100,000 population compared with 11 and 15 per 100,000 in Germany and France, respectively.¹ Many departments and in particular some special interests continue to experience considerable difficulties with recruitment, with approximately 41% of posts in some special interests remaining vacant for over 1 year.¹ Furthermore, there is an expected retirement of 25% by 2020 in certain areas such as breast radiology.²

The workforce situation is exacerbated by the continued annual increase in radiological examinations being performed with a 29% increase in the number of CT and 26% increase in the number of MRI between 2012–2015.¹

Proposed changes to healthcare with the delivery of 24/7 services within the NHS as well the impact of leaving the European Union is likely to further impact UK radiology departments.

In light of the recent changes, there has never been a more important time to examine the future career choices that face radiology trainees in the UK and the factors that may shape those choices. Exploring the factors that underpin and influence special interest choices may yield valuable insights into how trainees may be recruited into special interests that are particularly vulnerable to imminent workforce shortages.

The aim of this paper is to better understand the factors that influence special interest career choices and future aspirations of UK radiology trainees. Furthermore, we use breast radiology as a case study to identify potential ways to improve strategy planning. Similar work has been published in other countries, but to our knowledge, there is no UK based published work addressing this question.

METHODS AND MATERIALS

An online questionnaire was developed based on previous published work and tailored for UK trainees based on pre-survey data collection pertaining to important influencing factors for UK trainees.³ The online survey comprised 10 questions split across three sections (Appendix A):

- The first section presented questions relating to participant demographics (questions 1, 2, 4 and 10)
- The second section addressed special interest choices as well as personal and work related factors (questions 3, 5 and 6) that may influence those choices.
- The final section presented breast radiology as a potential career choice with subsequent questions aiming to better understand the trainee experience, perceptions of breast radiology as a career and factors that might improve its popularity (questions 7–9).

The questionnaire was uploaded to an online survey tool (SurveyMonkey.com) and an invitation for participation sent to all radiology trainees in the UK through the British Institute of Radiology, the RCR's Junior Radiologist's Forum, Training Programme Directors and by using social media (Facebook and Twitter).

The survey remained open for 6 weeks during December 2015 and January 2016. All data were securely hosted on the SurveyMonkey.com website that were subsequently downloaded for further analysis.

Figure 1. Percentage responses based on radiology training schemes in UK.

Table 1. Demographic data of respondents

	Percentage (%)
<i>Route of entry into radiology</i>	
Post foundation training	52
Following basic or core medical/surgical training	29
Other	19
<i>Year of training</i>	
ST1	16
ST2	21
ST3	25
ST4	16
ST5	13
ST6 or fellowship	6
Other	3
<i>Demographic information</i>	
Passed all components of FRCR examination	27
Full-time trainee	83
Less than full-time trainee	13
Intention to stay in the NHS after completing training	79
Want to work in a teaching hospital	59
Want to work in a district general hospital	36
Want to have a "portfolio career" combining clinical work with other interests e.g. leadership/management roles	47

RESULTS

232 responses from 1270 (18%) radiology trainees were returned across the 21 UK training schemes (Figure 1). Just over half of respondents (52%) had entered radiology after foundation training. Most (62%) were in the first 3 years of training and full-time trainees (83%) who wished to work in a teaching hospital (59%). Almost half (47%) expressed an interest in a "Portfolio Career"—a future combining a myriad of clinical and non-clinical responsibilities. The majority (80%) expressed an intention to stay in the NHS after completing their radiology specialty training (Table 1).

Musculoskeletal (16%), abdominal/gastrointestinal imaging (15%) and neuroradiology (12%) were ranked as the most popular special interest choices (Figure 2). The choice of special interest corresponding with the year of training showed that abdominal/gastrointestinal imaging was the most popular first choice in years 1 and 2, while musculoskeletal imaging was the most popular choice among trainees in years 4 and 5 (Table 2).

Figure 3 demonstrates a geographic breakdown of the most popular first choice special interests: musculoskeletal, abdominal/gastrointestinal and neuroradiology, with some areas demonstrating alternative popular first choices such as paediatric

Figure 2. The horizontal stacked bar chart demonstrates the first, second and third special interest choices ranked by respondents in absolute numbers.

imaging in the South West and cardiothoracic imaging in the South East of Scotland.

The various personal and work-related factors influencing special interest choice alongside their importance as ranked by respondents are summarized in Tables 3 and 4, respectively. The important personal factors were a strong personal interest, a successful or enjoyable rotation during training and intellectual challenge. Those that did not rank as importantly were geographic considerations, background prior to entering radiology and spousal/family considerations. Work related factors ranked as the most important were imaging modalities, direct impact on patient care and favourable work hours/flexibility/on-call commitments. The potential for private work and

Figure 3. Most popular radiology special interest based on training schemes across the UK.

Table 2. Special interest choices as ranked by respondents based on their year of training

Year of training	Most popular first choice	Most popular second choice
1	Abdominal/gastrointestinal	Musculoskeletal
2	Abdominal/gastrointestinal	Breast
3	Paediatrics	Neuroradiology
4	Musculoskeletal	Neuroradiology
5	Musculoskeletal	Head and neck
6	Neuroradiology and vascular interventional radiology	Non-vascular interventional radiology

Table 3. Personal factors and their importance in influencing radiology special interest choice

Personal factors	Extremely important, % (count)	Very important, % (count)	Somewhat important, % (count)	Slightly important, % (count)	Not important at all, % (count)
Strong personal interest	51 (118)	44 (102)	2 (4)	3 (8)	0 (0)
Successful or enjoyable rotation during training	35 (78)	45 (107)	15 (35)	3 (8)	2 (4)
Intellectual challenge	21 (48)	49 (113)	27 (62)	3 (8)	0 (0)
Influence of an inspirational role model/mentor	17 (39)	40 (92)	30 (70)	10 (23)	3 (8)
Exclusion of special interests that I did not enjoy	17 (40)	35 (81)	29 (68)	13 (30)	6 (13)
Spousal/family considerations	13 (31)	29 (67)	25 (58)	16 (36)	17 (40)
Background prior to entering radiology	10 (23)	25 (57)	29 (67)	15 (35)	22 (50)
Geographic considerations	4 (9)	22 (52)	34 (80)	12 (28)	27 (63)

The percentage figures correspond to each rating column based on the various personal factors listed in rows.

research or academic opportunities were ranked as the least important.

Breast radiology was used as a case study to assess modifiable factors that may influence trainees to consider it more strongly in the future. 23 respondents ranked breast radiology as their first-choice special interest followed by 15 ranking it as their second choice. Breast radiology was ranked as the fifth most popular special interest choice behind musculoskeletal, abdominal/gastrointestinal, neuroradiology and paediatric radiology. 64% of respondents had undergone a breast radiology rotation mostly in their second

or third year of training. 44% of those who had had a rotation expressed “it is just not for me” with a further 22% expressing that it was okay and that it was not particularly sold during their attachment but would consider it as a special interest choice (Figure 4).

Trainee perceptions of breast radiology based on free text comments from 70 respondents are summarized in Table 5. The top modifiable factors to increase trainee interest in breast radiology were an awareness of career prospects/opportunities, a good experience during the breast radiology rotation and an inspirational role model (Figure 5).

Table 4. Work-related factors and their importance in influencing radiology special interest choice

Work-related factors	Extremely important, % (count)	Very important, % (count)	Somewhat important, % (count)	Slightly important, % (count)	Not important at all, % (count)
Imaging modalities	24 (56)	50 (115)	22 (51)	1 (3)	3 (7)
Direct impact on patient care	24 (55)	48 (111)	21 (49)	4 (9)	3 (8)
Practical or interventional skills	21 (49)	31 (72)	24 (56)	17 (39)	7 (16)
Favourable work conditions	19 (45)	38 (87)	30 (69)	10 (24)	3 (7)
Job prospects – number of posts/competition	17 (40)	49 (104)	28 (65)	6 (15)	3 (8)
Teaching opportunities	13 (30)	41 (96)	32 (75)	10 (23)	3 (8)
Professional contact (direct/MDT colleagues)	13 (29)	43 (99)	35 (82)	6 (15)	3 (7)
Patient contact	13 (29)	32 (74)	34 (79)	15 (34)	7 (16)
Potential for private work (income)	9 (22)	19 (44)	30 (69)	19 (45)	22 (52)
Research/academic opportunities	9 (21)	25 (57)	33 (77)	18 (45)	14 (32)

The percentage figures correspond to each rating column based on the various work-related factors listed in rows. Work-related factors.

Figure 4. Trainee respondent's ratings of experience of breast radiology.

DISCUSSION

The impending challenges facing radiology in the UK have been highlighted in the RCR workforce report. The RCR is working hard to address these through increasing training capacity, making the most of existing numbers through innovative models of training and recruiting from abroad.⁴ Workforce planning and trainees' choice of special interest are important to ensure adequate delivery of care through predicting the number of future consultants required based on projected needs.¹ Some special interest choices need to be made by radiology trainees as early as their second or third year of training to secure certain fellowships either within the UK or abroad.

Our national UK survey collected data based on only 18% of current UK radiology trainees. The typical respondent was a radiology trainee in the first half of his/her training (37% or responses ST1 or ST2), most likely to have entered directly after foundation training. It is worth bearing in mind that the typical respondent may not have experienced the full range of special interests at the time of this survey and had yet to discover and decide on a chosen special interest. Abdominal imaging is the

most popular choice among junior trainees while musculo-skeletal is the favoured special interest among senior trainees (Table 2)—this is likely to be influenced, in part, by exposure and experience relative to stage of training. Assessing popularity of choices based on various training programmes reflected the most popular choices; however, some areas demonstrated other top choices such as cardiothoracic imaging in South East Scotland and non-vascular interventional radiology in the West Midlands, which may reflect local departmental reputation and mentorships. It is noteworthy that Paediatrics is clearly the most popular special interest choice in the South West, which may reflect the high quality of engagement and training provided in this part of the country. Some training schemes offer gynaecological or (non-system based) oncology imaging as rotations; however, little or late exposure to these may explain their relative unfamiliarity or unpopularity.

This research found that a strong personal interest, a successful or enjoyable rotation during training, intellectual challenge, varied imaging modalities, direct impact on patient care and working conditions are the most important factors influencing

Table 5. Summary of trainee perceptions of breast radiology as a special interest

Positive themes	Negative themes
<ul style="list-style-type: none"> • Patient contact • Multidisciplinary nature • Mix of modalities • Major oncology specialty • Clinical skills—diagnostic and interventional • Rewarding • Job prospects • Robust quality assessment in place • Sufficient level of work, keeping busy • Plenty of money for research • Autonomy to run one's own assessment clinics • Positive working environment 	<ul style="list-style-type: none"> • Repetitiveness and monotonous • Regular clinical assessment e.g. strict reporting targets and examination • Narrow range of conditions • Overworked • Anxious patients/stressful and emotionally challenging • Competition from reporting radiographers • Paucity of acute work

Figure 5. Modifiable factors that would have made trainees more interested in breast radiology.

special interest choice. An enjoyable trainee experience, exclusion of special interests not enjoyed and the influence of an inspirational role model/mentor are broad subjective factors that if harnessed into the organisation and delivery of special interest rotations within radiology training can prove to be powerful and influential tools. We propose that to responsibly promote radiological special interests that are under threat from staffing shortages, we—as radiologists, regardless of our own special interests—ought to not only engage and enthuse our trainees but highlight the strengths of certain special interests through their breadth, impact and prospects. Furthermore, we must strive to provide early and effective training opportunities that instill and nurture an interest into special interests that may be considered less popular.

There are many similarities between the role of a consultant radiologist working in a teaching hospital and district general hospital with the main differences being the complexity of cases and specialist services provided. A likely explanation for the higher levels of interest in trainees pursuing careers in teaching hospitals (59%) may be the level of exposure in earlier years to a teaching hospital compared with time spent in a district general hospital.

According to the RCR 2015 workforce census, there is an increasing trend toward less than full-time working demonstrated by UK radiology consultants (22% work less than 10 programmed activities per week), which can allow for more flexible utilisation of staff and effective use of resources to provide services outside of normal working hours.¹ Interestingly, 1 in 6 of our cohort expressed an interest in working less than

An alarming 20% of respondents reported an intention to leave the NHS after completing their training, which may be due to the dispute over Junior Doctors' Contracts between the British

Medical Association and government, which occurred at the time of conducting this survey.⁶ However, it would be devastating if large numbers of UK trained radiologists left the NHS. This would amplify the shortage of radiologists and deepen the workforce crisis we currently face and that lies ahead.

Breast radiology is a special interest that is particularly vulnerable to future workforce shortages with many departments facing crises. As such, we used it as a case study (using data from 70 volunteered free text comments) to help understand trainee perceptions of breast radiology and to propose a strategy for increasing and sustaining interest in breast imaging as a realistic and fulfilling special interest career choice (Box 1). Furthermore, it is promising that a recent RCR survey promotes similar actions to encourage breast radiology to deal with future shortfalls.²

One of the strengths of our study is that we captured trainee responses across a range of training years in different geographical locations characterizing a representative sample. These findings can potentially be extrapolated to help predict special interest choices of future consultants. We also collected data relating to personal and work-related factors that may influence special interest choice, future aspirations such as location of work as well as using breast radiology as a case study as a potential career choice.

A major limitation of our study is our small sample size. Despite the use of social media (Facebook and Twitter) that could have enabled information to be cascaded across UK radiology trainees rapidly, the low uptake may have been due to the timing of this survey during the aforementioned contract disputes or limited distribution to trainees. Another potential limitation is that data pertaining to lifestyle and family set-up was not collected to see if such factors may influence special interest choice. Albeit we had information regarding the intentions of trainees on the

Box 1. Breast radiology as a case study

Breast Radiology is a multimodality discipline that combines diagnostic, interventional and personal skills in the management of one of the most common disease processes of the 21st century.

How is breast radiology perceived?

Most breast assessment is carried out using a variety and mix of imaging modalities. In addition, the imaging of metastatic breast cancer includes reviewing staging CT, bone scintigrams, positron emission tomography CT and MRI (brain, bones, liver) for multidisciplinary team meetings. Furthermore, there are continued advances in breast radiology, for example, the emerging role of digital breast tomosynthesis.

It is the only special interest that incorporates radiographic, ultrasound and MR guided intervention. The interventions can only be performed by those undergoing dedicated training in breast imaging as either a breast radiologist or advanced practitioner/consultant radiographer.

The NHS Breast Screening Programme is the only general population-screening programme based on first line radiological investigation. The role of breast radiology in the one-stop clinics working as part of the multidisciplinary team provides a sense of immediate impact on patient care, which is rewarding. Furthermore, there is a sufficient level of work to keep busy.

Many advertised consultant posts have no on-call commitments and can afford increased flexibility of working patterns with favourable working conditions. There is autonomy to run one's own assessment clinics within a positive working environment.

Breast radiology can be perceived as unidimensional (one organ system, one disease process); however, the radiologist can alongside this develop other special interests. In addition, a breast radiologist has a potentially greater opportunity to develop a varied portfolio career incorporating teaching, research and management.

What can we do to make it better?

A substantial number of respondents (41%) stated that "an awareness of career prospects/opportunities/flexibility..." would have increased their level of interest in breast radiology. It is incumbent on breast radiologists to seek opportunities to engage and enthuse trainees on rotation. Over a third of respondents (36%), reported "A good experience during ... rotation through breast radiology" and over a quarter reported "an inspirational role model" (25%) and "better teaching or engagement" (26%) as factors that would increase their interest in breast radiology.

Training, not only involves imparting knowledge, but also broadening trainee perspectives on the potential benefits of a career in breast radiology, which includes favourable working conditions and flexibility *e.g.* combining special interests or developing a "Portfolio Career" may improve the level of recruitment into this special interest.

An early trainee experience in breast radiology, for instance, in the first or second year of training may help to attract the right trainees at the right time. Creating and capitalizing on early opportunities to engage and inspire trainees can lead to successful future recruitment.

The availability and advertisement of dedicated fellowships for breast radiology can improve interest whereby trainees can spend dedicated time within a breast imaging unit and collaborate with clinicians increasing their awareness of future career prospects.

type of hospital to work in and whether full-time or part time. Another limitation of a snapshot survey is that it reflects views at a specific time such that as a trainee progresses through various rotations, their future choices may change, in particular those in their earlier years of training. Also, the culture when the survey was conducted during contract disputes may have meant more individuals expressed an intention to leave the NHS.

This survey found that an improved awareness of career prospects/opportunities, a good experience during the rotation and an inspirational role model can help promote certain

special interests. Multi-factorial solutions are required to meet the challenge of addressing areas of unmet need. Training programmes can tailor individual training schedules and help provide trainees with the best possible options for career planning. Although outside the scope of this article, we suggest that a robust strategy for increasing recruitment into radiology must include early engagement of medical students, both pre-clinical and clinical. Promoting radiology to medical students through integrating radiology exposure during respective medical/surgical rotations could be one approach to create interest early.

CONCLUSIONS

This is the first survey of its kind in the UK literature designed to evaluate special interest career choices and the factors that influence those among radiology trainees. Special interests such as musculoskeletal and abdominal imaging are the most popular due to strong personal interest, an enjoyable trainee rotation

and intellectual challenge. The most influential objective factors include advanced or varied imaging modalities, direct impact on patient care and job prospects. To improve workforce planning and shortages in less popular choices, we need to address trainee's preconceptions, improve the trainee experience as well as exposure as suggested in our case study, breast radiology.

REFERENCES

1. The Royal College of Radiologists. Clinical Radiology UK workforce census 2015 report. London: The Royal College of Radiologists. 2016.
2. The Royal College of Radiologists. The breast imaging and diagnostic workforce in the United Kingdom. London: The Royal College of Radiologists. 2016 Available at: <https://www.rcr.ac.uk/publication/breast-imaging-and-diagnostic-workforceunited-kingdom><https://www.rcr.ac.uk/publication/breast-imaging-and-diagnostic-workforce-united-kingdom>
3. Arnold RW, Goske MJ, Bulas DI, Benya EC, Ying J, Sunshine JH. Factors influencing subspecialty choice among Radiology residents: a case study of pediatric radiology. *J AM Coll Rad* 2009; **6**: 635–42. doi: <https://doi.org/10.1016/j.jacr.2009.05.005>
4. The Royal College of Radiologists. RCR Information submitted to Health Education England workforce planning and education commissioning round – 2015/16. Available from: https://www.rcr.ac.uk/sites/default/files/documents/hee_evidence_2015-16_clinical_radiology.pdf [March 2017]
5. Parthiraja F, Wilson MC. The rise and rise of the portfolio career; BMJ Careers. 2011. Available from: <http://careers.bmj.com/careers/advice/view-article.html?id=20001807> [cited 27 March 2017]
6. British Medical Association. 2017. Available from: <https://www.bma.org.uk/collectivevoice/influence/key-negotiations/terms-and-conditions/junior-doctor>. [cited 27 March 2017]

APPENDIX A

Online survey