

Clinical Audit and Research in Radiography Practice: An Exploration of the English Landscape

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Abstract

Background: Research and clinical audit are central to the quality improvement (QI) process in healthcare; whereas research produces new knowledge, clinical audit establishes if practice is meeting set standards. Thus, radiographers have responsibility to engaging in these QI activities. This study aimed to explore radiographers' understanding, attitudes and level of involvement in clinical research and audit across England.

Methods: A cross-sectional survey using an online questionnaire for data collection over a 6-week period was employed. The questionnaire consisted of open and closed ended questions. Participants were recruited through social media. The quantitative data obtained was analysed using Statistical Package for Social Sciences (SPSS) Version 26 (IBM Inc, Armonk, NY) whilst content analysis was used to analyse the free-response data.

Results: A total of 100 valid responses were obtained after exclusion of 45 partial and/or incomplete responses. Radiographers showed a positive attitude towards involvement in research and audit with overall mean score of 3.85 (SD 0.80) and 4.01 (SD 0.80), respectively. Of the respondents, 35.7% (n = 35/98) were currently involved in clinical audit projects whilst 78.6% (n = 77/98) have previously been involved. Radiographers with postgraduate degrees were significantly more likely to have initiated research, 61.5% (n = 16/26) (p = 0.01) and to have previously been involved with research, 80.8% (n = 21/26) (p = 0.02). A significant association between radiographers' role and implementation of changes, following an audit (p = 0.03) was noted. Similarly, a significant association was noted between radiographers' role and initiation of research (p = 0.05).

Conclusion: Clinical radiographers in England showed a positive attitude towards research and audit. However, this did not translate into actual participation in research and audit activities.

Implications for practice: The need to stimulate clinical radiographers' interest in clinical audit and research is highlighted. Additionally, the findings support the rationale for managers to give more support including protected time to radiographers to engage in QI activities.

Keywords: Clinical Audit, Research, Quality Improvement, Radiographers, Survey.

Introduction

In recent times, the focus of healthcare systems has shifted towards improved clinical outcomes, which requires application of evidence-based practice (EBP) through rigorous research and clinical audit cycles.^{1,2} Thus, research and clinical audit are central to quality improvement (QI) and consequently, providing an evidence base for enhancing the patients' experience through the care pathway.^{3,4} This recognition led to the establishment of the **National Institute for Health and Care Excellence** (NICE) by the United Kingdom (UK) government to ensure improvement in quality of care and outcomes across the National Health Service (NHS).⁵ These efforts resulted in an increase in the use of research and clinical audit findings for the development of clinical guidelines and standards.⁵

Clinical audit is a critical constituent of the QI process aimed at improving quality of healthcare delivery through systematic review of practices and services against set standards.⁶ Research on the other hand is defined as a structured activity, involving systematic collection and analysis of data, with the aim to produce new knowledge for public scrutiny through replication, verification or otherwise for the benefit of society,^{1,7,8} and commonly requires ethical committee review and approval.^{9,10}

All healthcare professionals including radiographers are expected to apply research evidence to their practice as well as initiating research activities.^{11,12,13} Of note, one of the core clinical domains of consultant clinical radiography practice is participation in research activities and implementation of evidence to practice.¹¹ Harris and Peterson¹⁴ explored the research domains of consultant radiography practice in the UK, of the respondents only 30% (n=14) had published research findings. In a similar study¹⁵ that assessed Singaporean radiographers' involvement in research, it was revealed that 39% (n=44) of respondents were involved in research activities.¹⁵ However, of those who indicated their involvement in research, 63% of them stated that their research was either part of undergraduate or postgraduate programmes of study rather than independent research.¹⁵ Another report from Norway that explored research activities of the radiography workforce indicated that only 19% (n=133) of respondents had been involved in research within the past five years prior.¹⁶ Similar recent reports from Australia¹⁷ and Uganda¹⁸ highlight the relatively low involvement

of the clinical radiography workforce in research activities.

There is paucity of research on radiographers' involvement in clinical audit. Relevant parallel literature on involvement in audit by other healthcare professions is similarly limited. For example, Millard, MacArthur and McLackland¹⁹, report that over 70% of the responding healthcare professionals surveyed did not participate in any form of audit in the preceding 12 months. Similar findings of low participation in audit have been reported elsewhere.^{20,21}

Although, few studies from different professions have explored understanding, attitudes and level of involvement of practitioners in research and audit^{22,23,24}, much fewer studies^{16,25,26} have focused on the radiography profession and the English landscape is not well understood. However, the need for improved patient care across medical imaging and radiotherapy departments and the renewed functions of the NICE, calls for more clinical radiographer-led research to inform development of appropriate practice guidelines. The aim of the current study is to explore radiographers' level of involvement in research and audit processes and factors that affect their involvement.

Methods

Study Design & Survey Questionnaire Development

A descriptive, cross-sectional survey approach that employed convenient sampling was used for this study. This was to allow the recruitment of an optimal sample in the range of 100-130 radiographers registered and practising in England, an estimate based on a similar previous study by Ooi and colleagues.¹⁵

Based on available literature^{24,27,28} and the experience of the authors in clinical radiography practice in relation to research and clinical audits, the survey questionnaire was developed. The Research and Audit Awareness (RAA) questionnaire consisted of 21 questions, made up of closed and open-ended questions and 25 item 5-point Likert scales. Questions 5 and 6 were made up of 12 and 13 item 5-point Likert scales, respectively (1 = strongly disagree, 2 = disagree, 3

= neither agree nor disagree, 4 = agree and 5 = strongly agree) (see Appendix 1). The questionnaire was piloted among five radiographers and the comments obtained guided the revision into a final research instrument for the main study.

Validity, stability and reliability of the Questionnaire

The questionnaire was assessed for face and content validity by three experts (two were senior radiographers and the third person was an expert academic in questionnaire design). Also, the questionnaire was assessed for internal consistency by calculating Cronbach's alpha, which was determined to be 0.62 and 0.79 for questions 5 and 6, respectively. These Cronbach's alpha values were considered optimal and acceptable.²⁹ Furthermore, the questionnaire was assessed for stability by computing test-retest correlation, which was determined to be 0.83, indicating strong stability.³⁰

Survey Questionnaire Distribution

Qualtrics Survey (<https://www.qualtrics.com/uk/core-xm/survey-software/>) was used to host the questionnaire online and was distributed over a 6-week period (3rd February 2021 to 15th March 2021). Social media platforms (Facebook, LinkedIn and Twitter) were used to invite participants and across networks of professional colleagues of the authors. There was also an option for participants who wanted to request a paper questionnaire to do so but none were issued. The questionnaire was designed to automatically pre-screen participants based on preliminary responses to ensure that only radiographers registered and practising in England were allowed full access to proceed to complete the survey.

Data analysis

SPSS Version 26 (IBM Inc, Armonk, NY) was used to analyse the obtained quantitative data. A chi-square (χ^2) test was used to compare nominal level data. The Likert scale scores for the attitude items were converted to interval level data by calculating the mean score for each item.⁸ This made it possible for parametric analysis to be performed. Using the mean scores, association of participants' demographics and attitude towards research and audit was analysed through Analysis of Variance (ANOVA) and t-test. A *p*-value of <0.05 was considered statistically significant.

Content analysis was used to analyse the free-response data.³¹ Recurring themes from open-ended responses were coded. This made it possible for the data to be analysed quantitatively, using descriptive statistics.

Participants were asked to define clinical audit and research and these were compared with published definitions.^{1,6} For the purpose of analysis, participants' definitions were categorised into three: those that contained keywords from published definitions or convey the meanings of research and audit were classified as fully matched, those with limited keywords or limited in meaning were classified as partially matched and completely mismatched for those definitions that did not convey any meanings relative to the published definitions.

Ethical considerations

King's College London (KCL) Research Ethics Committee's (REC) approval was obtained on 24th July 2020, before data collection started (*Ethical Clearance Reference Number: MRSU-19/20-20068*). Informed consent was also obtained from participants and they were not asked to provide any identifiable information and all information collected were anonymised.

Results

A total of 145 questionnaires were returned, but 45 were partially completed with inadequate information and were therefore excluded. Of these, 61% (n = 60/98) of the respondents were female. The majority (91.0%, n = 91/100) of respondents work full-time and nearly half (49.0%, n = 49/100) were employed at NHS Agenda for Change Band 6. Also, the majority (75.5%, n = 74/98) of respondents have diploma or degree as their highest qualification.

Understanding of research and audit

Comparisons were made between participants' definitions of audit and research and published definitions.^{1,6,7,8} Only 14.0% and 4.0% of the participants correctly matched the definitions of audit and research, respectively. The number of participants' definitions assessed to be complete mismatch were 29.0% for audit and 42.0% for research.

Involvement in audit and research

The results showed that 35.7% (n = 35/98) of respondents were currently involved in undertaking audit whilst 78.6% (n = 77/98) have previously been involved. Also, 44.3% (n = 43/97) of the respondents have ever initiated an audit project and 63.3% (n = 62/98) indicated that their departments made changes to their services following an audit.

Moreover, 18.4% (n = 18/98) were currently involved in research, 59.2% (n = 58/98) have previously been involved and 38.5% (n = 37/96) have ever initiated research. Sixty-nine percent (n = 66/96) of the respondents have read research articles in the past 3 months, 30.2% (n = 29/96) have carried out detailed literature search in the past 12 months and 27.1% (n = 26/96) have received training on how to evaluate articles in journals since qualifying.

1 A chi-square test indicated a significant association between radiographers' role and implementation of changes, following an audit ($p = 0.03$) (Table 1).
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3 Research radiographers, practice educators and radiotherapists are
4 significantly more likely to implement changes following an audit.
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6 Furthermore, a chi-square test revealed that radiographers with postgraduate
7 qualifications are significantly more likely to have been previously involved in
8 audit compared to those with degree or diploma level qualifications ($p =$
9 0.004).
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16 A chi-square test showed that radiographers who are over forty years old are
17 significantly more likely to have previously been involved with research ($p =$
18 0.04) (Table 2). Similarly, radiographers who are over forty are significantly
19 more likely to have initiated research ($p = 0.05$).
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25 Table 2 shows, there is a significant association between radiographers' role
26 and initiation of research ($p = 0.05$). More radiographers with postgraduate
27 qualifications have initiated research (61.5%) and previously been involved in
28 research (80.8%) than those with diploma or degree (29.0%) and (50.5%)
29 respectively. Likewise, chi-square test revealed that radiographers with
30 postgraduate degrees were significantly more likely to have initiated research
31 ($p = 0.01$) and to have previously been involved with research ($p = 0.02$).
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39 NHS Agenda for change Band 7 radiographers were significantly more likely
40 to read research articles ($p = 0.03$), carry out a literature search ($p = 0.02$) and
41 receive research training ($p = 0.002$) compared to the rest of the bands.
42 Radiographers who are over forty years old were significantly more likely to
43 have received research training ($p = 0.002$) compared to the rest of the age
44 groups. Similarly, radiographers with postgraduate qualifications and those
45 with role as reporting or mammographer were significantly more likely to have
46 received research training ($p = 0.002$) and ($p = 0.003$), respectively. In
47 addition, radiographers who work in district general hospital were significantly
48 more likely to engage in literature search ($p = 0.05$).
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Attitude towards audit and research

None of the participants' demographic data showed significant association with their attitude towards audit. The overall mean score and standard deviation (SD) for participants' attitudes towards audit was 4.01 (SD 0.80) (on a scale of 1 to 5 with highest score indicating more positive attitude) (Table 3). The majority of respondents strongly agreed to the statement 'Audit improves patient care' with a mean score of 4.51 (SD 0.65) (Table 3).

Similarly, there was no significant association between the participants' demographic data and their attitude towards research. Generally, participants demonstrated positive attitude towards research with an overall mean score of 3.85 (SD 0.80) (Table 3). Also, the majority of respondents agreed to the statement 'research improves patient care' with a mean score of 4.42 (SD 0.68) (Table 3).

Discussion

According to the Health and Care Professions Council (HCPC)¹², radiographers' involvement in research and audit activities is mandatory and not a choice. Therefore, it is important to assess radiographers' understanding and attitudes towards research and audit, as that will impact on their engagement in these activities. Thus far, the English landscape in terms of clinical radiographer's understanding, involvement and attitudes towards research and audit is not clear.

Involvement in audit and research

The findings of the present study reveal that, radiographers' involvement in audit is low. Under the standards of proficiency for radiographers, the HCPC¹² states that, "registrant radiographers must be able to maintain an effective audit trail and work towards continual improvement". Although, the current study indicates that 79% of respondents have previously been involved in audit, only few were currently involved. The present findings appear to be consistent with earlier studies^{12,21} and thus, urgent steps are required to incorporate audit and research training in the existing radiography training

curriculum³² while training practitioners through continuous professional activities.

Furthermore, 44% of respondents have initiated audit and 63% of respondents have indicated that their departments have made changes to services following an audit. The current findings suggest that more than half (>50%) of respondents have never initiated an audit. This concurs with the findings from Harrison and colleagues²⁴, where 52% of responding dieticians have initiated audit and 63% indicated that their departments have made changes to services following an audit. However, the present findings contradict Fox's²¹ study, where only 28% of responding nurses have initiated a clinical audit project. This indicates an improvement in terms of healthcare professionals initiating audit projects.

In this study, involvement in audit was not associated with age, gender, place of work, employment band, working hours and years of experience. However, there was an association between role and implementation of changes following an audit ($p = 0.03$) with radiographers working in interventional/cardiac imaging and ultrasound least likely to implement changes following an audit. Also, qualification was associated with previous involvement in audit ($p = 0.004$) with radiographers having postgraduate qualifications more likely to have previously been involved in audit. Perhaps, radiographers with postgraduate qualification have better understanding of the importance of audit to quality improvement and have the requisite skills and knowledge to undertake it. Their involvement might also have been part of a requirement for their postgraduate studies.

Involvement in research was not encouraging as only 18% of respondents were currently involved, 59% have previously been involved and 39% have ever initiated research. The current findings are congruent with several other previous studies.^{15,23,33} Again, the results show that 69% of respondents have read research article within the last three months, 30% have performed detailed literature search within the last 12 months and 27% have received research training. The percentage of respondents reported to have read

research articles is similar to the findings reported by Ooi and colleagues.¹⁵ According to HCPC¹² every registrant radiographer is required to engage in research activities, apply evidence to their practice and be able to evaluate practice systematically. In addition, the SCoR's³⁴ 2016-2021 strategy in part, states that by 2021 all job descriptions across all radiography professions must include responsibility to engage in research activities. Unfortunately, the present involvement in research by radiographers suggests that the number of radiographers taking part in research is low and potentially falling short of the HCPC's standards for registrant radiographers. The lack of participation in research by radiographers may be attributed to lack of research skills and knowledge, as pointed out by Upton and Upton.³⁵ Of note, current pressure on the imaging and radiotherapy workforce which has been escalated by the COVID-19 pandemic has further reduced capacity for radiographer-led research and/or audit activities and requires urgent attention.^{36,37,38}

Involvement in research and research processes were not associated with gender, working hours or years of experience. However, age group, employment band, role, workplace and qualification showed significant association with involvement in research activities. Those in the over forty age group were significantly more likely to have received research training ($p = 0.002$) and previously been involved in research ($p = 0.04$) than those between 30-40 and less than 30 age groups. Also, those with postgraduate qualifications were significantly more likely to have received research training ($p = 0.02$) and previously been involved in research than those with diploma or degree qualifications. It is likely that those with postgraduate qualifications have undertaken research training as part of their postgraduate studies. It is also possible that their involvement in research might have been part of a requirement for postgraduate studies as reported previously.¹⁵ Moreover, those in employment NHS band 7 group were significantly more likely to have read research articles, performed literature search and received research training. Reasons for undertaking literature search by respondents varied with majority (56%) indicating postgraduate study as the reason behind their involvement. NHS Band 7 radiographers are advanced practitioners, and, in most cases, there is a requirement for undertaking postgraduate training and

these could explain their involvement in these activities. Reporting radiographers and mammographers were more likely to have received research training than other roles. This is not surprising as these roles have a requirement for postgraduate training. Again, those working in district general hospital were more likely to have carried out literature search than other hospitals. The low participation by radiographers in other roles and lower employment bands may be due to lack of research skills and knowledge.

Understanding of audit and research

Respondents' definitions of audit and research were compared with published definition of clinical audit⁶ and research^{1,7,8}. Respondents' definitions of both clinical audit and research were very disappointing as majority completely mismatched both definitions. Only 5% and 2% completely matched definitions of clinical audit and research, respectively. These findings suggest radiographers' lack of research and clinical audit awareness and their importance. However, this is not peculiar to radiographers as Harrison and colleagues'²⁴ survey on dieticians recorded similar results.

Attitude towards audit and research

Overall, radiographers demonstrated positive attitude towards clinical audit with a mean score of 4.01 (SD 0.80). Unfortunately, this does not represent intentions or actual practice. This may be due to lack of skills and knowledge of audit processes, support from management and protected time to engage in audit activities. This current finding is similar to previous research.²⁴ In this study, none of the participants' demographics showed significant association with their attitudes towards audit. This, however, does not support earlier research by Harrison and colleagues²⁴, where role and employment band were found to be associated with responding dieticians' attitude towards audit.

Generally, radiographers showed positive attitude toward research with an overall mean score of 3.85 (SD 0.80). This contradicts their actual involvement in research activities and awareness of research, given that only 2% of radiographers were able to define research correctly. It is highly likely that their positive view on research is sincere, but they lack research skills

and knowledge, support and protected time to engage in research activities. This finding is similar to previous studies that explored healthcare professionals' attitudes towards research.^{15,23,33} Also, in this study, none of the participants' demographics showed significant association with their attitudes towards research.

Strengths & Limitations

The current study is thus far the first to explore radiographers' understanding and attitudes towards audit and research in England. It is also the first to simultaneously assess radiographers' involvement in clinical audit and research activities. Furthermore, this study has resulted in the development of a validated cross-sectional questionnaire specific to the field of radiography. This RAA questionnaire (Appendix 1) can serve as a baseline instrument for researchers to refine and validate further for future studies.

Even though the current study has highlighted the level of radiographers' involvement, their understanding and attitudes towards research and audit, the findings cannot be generalised due to a number of limitations. A convenient sample was used and sample size for this study was estimated based on previous studies from a different geographical region with potentially different regulatory requirements for research among practitioners. In addition, online surveys are often associated with limitations such as self-selection bias, which may introduce bias to the data and consequently, affect the generalisability of the findings of the study. Given these limitations, the findings should be interpreted with caution.

Conclusion

This study provides detailed analysis of radiographers' involvement, understanding and attitudes towards research and audit. In general, radiographers in England showed positive attitude towards research and audit. However, this did not translate into actual participation in research and audit activities. The findings showed that the level of radiographers' involvement in research and audit was low. Also, the findings highlighted radiographers' lack of understanding of research and audit processes,

1 particularly, where only a handful of them were able to accurately define
2 research and audit. This has, therefore, highlighted the need to stimulate
3 interest in clinical audit and research and to support radiographers to engage
4 in these activities. In order to reverse this low participation of clinical
5 radiographers in QI activities, it is suggested that research and audit leads
6 should be appointed in radiology departments and considerations for
7 promotion be linked to participation in research and audit activities.
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16 **Conflict of interest**

17 The authors declared no conflict of interest.
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Table 1. Relationship between demographic data and involvement in audit

Demographic	Current involvement n(%)	p- value	Previous involvement n(%)	p- value	Initiated audit n(%)	p- value	Implemented changes n(%)	p- value
Age group (n=98)								
<30	12(33.3)		26(72.2)		15(41.7)		19(52.8)	
30-40	9(31.0)	0.50 ^c	22(75.9)	0.24 ^c	11(37.9)	0.45 ^c	19(65.5)	0.12 ^a
>40	14(42.4)		29(87.9)		17(53.1)		24(72.7)	
Gender (n=96)								
Male	11(29.7)	0.38 ^c	27(73.0)	0.48 ^b	12(33.3)	0.15 ^b	23(62.2)	0.64 ^c
Female	23(39.0)		48(81.4)		30(50.8)		37(62.7)	
Band (n=98)								
Band 5	6(40.0)		10(66.7)		4(26.7)		8(53.3)	
Band 6	13(27.1)		36(75.0)		21(43.8)		32(66.7)	
Band 7	10(41.7)	0.69 ^c	20(83.3)	0.13 ^c	13(56.5)	0.46 ^c	13(54.2)	0.39 ^c
Band 8a and above	5(62.5)		8(100.0)		4(50.0)		7(87.5)	
Other	1(33.3)		3(100.0)		1(33.3)		2(66.7)	
Role (n=98)								
General radiography	12(29.3)		29(70.7)		13(32.5)		24(58.5)	
CT/MRI/Nuclear medicine	10(40.0)		19(76.0)		15(60.0)		19(76.0)	
Interventional/Cardiac imaging	2(33.3)		5(83.3)		2(33.3)		1(16.7)	
Ultrasound	1(16.7)	0.57 ^c	5(83.3)	0.39 ^c	3(50.0)	0.50 ^c	2(33.3)	0.03^c
Reporting radiography/Mammography	2(40.0)		5(100.0)		2(40.0)		3(60.0)	
Managerial	3(100.0)		3(100.0)		1(33.3)		2(66.7)	
Research/Practice educator	0(0.0)		2(100.0)		1(50.0)		2(100.0)	
Therapeutic radiography	5(50.0)		9(90.0)		6(60.0)		9(90.0)	
Working hours (n=98)								
Part time	4(66.7)		5(83.3)		2(33.3)		4(66.7)	
Full time	30(33.7)	0.62 ^c	69(77.5)	0.45 ^c	39(44.3)	0.64 ^c	55(61.8)	0.24 ^c

Bank	1(33.3)		3(100.0)		2(66.7)		3(100.0)	
Years of experience (n=100)								
<5	13(32.5)		31(77.5)		15(37.5)		21(52.5)	
5-10	10(34.5)	0.52 ^c	20(69.0)	0.14 ^c	13(44.8)	0.42 ^a	21(72.4)	0.07 ^c
>10	12(41.4)		26(89.7)		15(53.6)		20(69.0)	
Highest qualification (n=97)								
Diploma/degree	23(32.4)	0.36 ^c	50(70.4)	0.004^b	28(40.0)	0.33 ^b	42(59.2)	0.37 ^c
Postgraduate degree	12(46.2)		26(100.0)		14(53.8)		19(73.1)	
Workplace (n=98)								
District general hospital	11(36.7)		23(76.7)		12(40.0)		19(63.3)	
Teaching hospital	16(31.4)		42(82.4)		22(44.0)		31(60.8)	
Community hospital	3(42.9)	0.31 ^c	3(42.9)	0.17 ^c	1(14.3)	0.06 ^c	4(57.1)	0.88 ^c
Research centre	0(0.0)		3(100.0)		2(66.7)		3(100.0)	
Private hospital	5(71.4)		(685.7)		6(85.7)		5(71.4)	

a = chi-square test, b = Yate's Continuity Correction and c = likelihood ratio.
Percentages (%) are derived from crosstabulations of chi-square test.

Table 2. Relationship between demographic data and research involvement

Demographic	Current involvement n(%)	p- value	Previous involvement n(%)	p- value	Initiated research n(%)	p- value
Age group (n=98)						
<30	6(16.7)		17(47.2)		8(22.9)	
30-40	4(13.8)	0.54 ^c	16(55.2)	0.04^c	13(44.8)	0.05^c
>40	8(24.2)		25(75.8)		16(50.0)	
Gender (n=96)						
Male	7(18.9)	0.37 ^c	20(54.1)	0.65 ^b	16(45.7)	0.28 ^b
Female	10(16.9)		36(61.0)		19(32.2)	
Band (n=98)						
Band 5	3(20.0)		10(66.7)		8(53.3)	
Band 6	5(10.4)		22(45.8)		14(29.8)	
Band 7	7(29.2)	0.40 ^c	17(70.8)	0.06 ^c	9(39.1)	0.36 ^c
Band 8a and above	2(25.0)		6(75.0)		4(50.0)	
Other	1(33.3)		3(100.0)		2(66.7)	
Role (n=98)						
General radiography	6(14.6)		21(51.2)		14(35.0)	
CT/MRI/Nuclear medicine	6(24.0)		17(68.0)		12(50.0)	
Interventional/Cardiac imaging	1(16.7)		6(100.0)		5(83.3)	
Ultrasound	2(33.3)	0.63 ^c	2(33.3)	0.11 ^c	0(0.0)	0.05^c
Reporting/Mammography	0(0.0)		4(80.0)		2(40.0)	
Managerial	0(0.0)		1(33.3)		1(33.3)	
Research/Practice educator	1(50.0)		1(50.0)		1(50.0)	
Therapeutic radiography	2(20.0)		6(60.0)		2(20.0)	
Working hours (n=98)						
Part time	0(0.00)		5(83.3)		3(50.0)	

Full time	16(18.0)	0.19 ^c	51(57.3)	0.40 ^c	33(37.9)	0.83 ^c
Bank	2(66.7)		2(66.7)		1(33.3)	
Years of experience (n=98)						
<5	6(15.0)		19(47.5)		13(33.3)	
5-10	5(17.2)	0.18 ^c	19(65.5)	0.14 ^c	11(37.9)	0.55 ^c
>10	7(24.1)		20(69.0)		13(46.4)	
Highest qualification (n=97)						
Diploma/degree	10(14.1)	0.14 ^c	36(50.5)	0.02^b	20(29.0)	0.01^b
Postgraduate degree	8(30.8)		21(80.8)		16(61.5)	
Workplace (n=98)						
District general hospital	6(20.0)		15(50.0)		12(40.0)	
Teaching hospital	6(11.8)		33(64.7)		19(38.8)	
Community hospital	1(14.3)	0.42 ^c	4(57.1)	0.56 ^c	2(28.6)	0.98 ^c
Research centre	2(66.7)		1(33.3)		1(33.3)	
Private hospital	3(42.9)		5(71.4)		3(42.9)	

a = chi-square test, b = Yate's Continuity Correction and c = likelihood ratio.
Percentages (%) are derived from crosstabulations of chi-square test

Table 3. Attitudes towards audit and research

Statement	Mean	SD
Audit		
Seeing patients is more important than audit	3.09	0.91
Audit helps to justify the need for our service	3.99	0.83
Audit brings about change	4.20	0.81
Audit is part of my role	3.94	0.85
Radiographers should question their practice	4.41	0.58
Audit improves patient care	4.51	0.65
Audit helps to raise the profile of radiographers	3.91	0.93
Overall attitude towards audit	4.01	0.80
Research		
Research should be carried out by all radiographers	3.55	1.03
Involvement in research would benefit my department	4.16	0.68
Research promotes critical thinking	4.34	0.56
All radiographers should be able to act on research findings	4.02	0.78
Research improves patient care	4.42	0.68
Clinical research needs to be led by clinicians	3.40	0.98
Seeing patients is more important than research	3.09	0.79
Overall attitude towards research	3.85	0.80

The purpose of this questionnaire is to investigate the understanding, attitudes and barriers towards research and audit amongst radiographers in England. Answers will be strictly confidential and anonymity of participants is guaranteed.

1. General details about you

Please tick the box where appropriate

(a) Where do you work?

District General Hospital ☐ Teaching Hospital ☐ Community Hospital ☐ Other ☐

If 'other' please specify -----

(b) Do you work

Part time ☐ Full time ☐ or Bank ☐

(c) Please indicate the band at which you are employed

Band 5 ☐ Band 6 ☐ Band 7 ☐ Band 8a or above ☐ Other ☐

(d) Which of the following best describes your role?

General Radiography ☐ CT ☐ MRI ☐ Nuclear Medicine ☐ Interventional ☐ Cardiac Imaging
☐ Ultrasound ☐ Manager/clinical workload ☐ Manager/ no clinical workload ☐ Reporting
Radiographer ☐ Other ☐ If 'other' please specify -----

(e) In which year did you qualify as a radiographer? -----

(f) Which age range do you fit into?

20-29 ☐ 30-39 ☐ 40-49 ☐ 50-59 ☐ 60+ ☐

2. What do you understand the following terms to mean? If you are not sure please indicate this in your answer.

Audit:

Research:

3. Your involvement in research and or audit after qualifying

Please tick the appropriate box

(a) Are you currently involved in undertaking

Audit? Yes ☐ No ☐ Don't know ☐

Research? Yes ☐ No ☐ Don't know ☐

(b) Have you previously been involved in undertaking

Audit? Yes ☐ No ☐ Don't know ☐

Research? Yes ☐ No ☐ Don't know ☐

(c) Have you ever initiated

An audit project? Yes ☐ No ☐ Don't know ☐

A research project? Yes ☐ No ☐ Don't know ☐

(d) Has your department made any changes to your service as a result of an audit?

Yes ☐ No ☐ Don't know ☐

4. Literature and journals

Please tick one box for each answer

(a) Have you read any research articles in the past 3 months?

Yes ☐ No ☐

(b) Have you carried out a detailed literature search in the past 12 months?

Yes ☐ No ☐

If 'yes', please indicate why you did a literature search

(c) Since qualifying, have you received training on how to evaluate articles in journals?

Yes ☐ No ☐

5. Please indicate whether you agree or disagree with the following statements about audit

Please tick one box for each statement

Statement	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Seeing patients is more important than audit.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Audit helps to justify the need for our services.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Audit brings about change.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Audit is part of my role.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radiographers should question their practice.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Audit improves patient care.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Audit helps to raise the profile of radiographers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I understand audit terminology.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have the time to do audit.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have the motivation to do audit.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I receive support from my department to do audit.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I'm sure how to go about doing audit.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Please indicate whether you agree or disagree with the following statements about research.

Please tick one box for each statement.

Statement	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Research should be carried out by all radiographers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Involvement in research would benefit my department.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Research promotes critical thinking.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
All radiographers should be able to act on research.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Research improves patient care.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clinical research needs to be led by clinicians.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Seeing patients is more important than research.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I'm sure how to go about doing research.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I receive support from my department to carry out research.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My university training prepared me to do research.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I find it easy to interpret research findings.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have the time to carry out research.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have the motivation to do research.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. Training/support needs

Please comment on any training and or support you would like to see available in your department in order to facilitate radiographers' involvement in research and or audit.

Audit:

Research:

8. How would you like to access this training/support?

9. Any other comment?

Thank you for taking your time to complete this questionnaire.