The College of Radiographers Research Priorities for the Radiographic Profession: A Delphi Consensus Study

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Introduction

Research should be at the heart of healthcare practice, underpinning all aspects of patient care. The Department of Health (DoH) in England has research and innovation as one of its key priorities for 2016-2017[1] and a number of national policy documents reinforce the importance of research for ensuring efficient, safe and innovative service delivery.[2-4] The Darzi report (High Quality Care for All)[5] stresses the importance of clinical and non-clinical evidence-based practice for providing a National Health Service (NHS) with quality of care at its heart.

In order for radiography practice to move forward, radiographers need to lead and participate in research and implement the findings of such research to enable improvements in health care delivery, patient care, technological innovations, education, and development of the workforce. This need is made explicit in the Health and Care Professions Council (HCPC) Standards of Proficiency for Radiographers, which state that radiographers must be able to engage in evidence-based practice.[6]

A newly revised research strategy from the Society and College of Radiographers (SCoR) from 2016 to 2021 sets a clear vision to improve patient care and outcomes by continuing to develop, grow and implement a high quality evidence base. [7] In order to meet the aims and vision of the SCoR research strategy, it is important to identify what the key research areas will be for radiography research in the UK over the next five years. These research priority areas will enable the profession to focus research activity on topics that are deemed to be critical for current and future radiography practice; and enable appropriate channelling of funding resources.

Other Allied Health Professions (AHPs) have identified national research priorities through a Delphi consensus method, [8-14] and the rationale for choosing a Delphi method is highlighted by the following:

- the problem lends itself to subjective judgments made on a collective basis
- defining research priorities for a whole profession requires input from specialisms within radiography (both diagnostic and therapeutic)
- finding time for frequent meetings can be difficult
- group communication is more efficient than individual meetings.

It is important to note that simply identifying potential priority areas may not be sufficient to ensure research efforts actually focus in these areas. Marshall emphasises

that in critical care nursing, the research priorities identified for the US in the early 1980s and 1990s were not followed by subsequent published research in those priority areas[15]. However, this mismatch between identified priorities and subsequent published research is most likely a result of a lack of funding emphasis on the priority areas that were defined. To address this, the SCoR Research Strategy states that departments will be encouraged to use the identified national research priorities to inform local research strategies, and that College of Radiographers Industry Partnership Scheme (CoRIPS) funding must match at least one of the research priorities (SCoR 2015).

The aim of this project was to use a modified Delphi consensus method to establish key research priority areas for the radiography profession. This report describes the methods of that process and presents the research priorities identified through the consensus process.

Method

The Delphi method

The Delphi method is a consensus technique that allows the systematic collection of informed judgements from a panel of experts. Research carried out in other allied health professions has used the Delphi method to establish research priorities.[8, 10, 11, 13]

A modified Delphi technique was used to establish and prioritise research priorities for the radiography profession for 2016-2021, using a three-round iterative process. The first round consisted of questionnaires administered through the SurveyMonkey online software (SurveyMonkey.com LLC, California, USA, www.surveymonkey.com). Data from the first round was summarised and fed back to participants in rounds two and three to enable consensus to be established and the suggested research areas to be prioritised. All data fed back was anonymised to maintain participant confidentiality. Demographic data was also collected, including age, gender, ethnic group, country of work, years of radiography experience and main specialties, along with how recently panel members had been service users or enrolled on a higher education course.

Participants

Prior to recruitment, the research team and representatives from the SCoR identified key areas within radiotherapy and diagnostic imaging from which to recruit participants for the expert panel. It was important to ensure all main specialities were represented. The expert panel included those from advanced clinical practice, research, management, clinical service provision, education and users of radiography services as well as a range of radiography specialties including:

- paediatric radiography;
- ultrasound;
- mammography ;
- reporting radiographers;
- radiotherapy ;
- education.

The expert panel was recruited via an email request for volunteers to SCoR expert group members; higher education institution (HEI) course leaders; radiography service managers, and service users. Course leaders from HEIs were also invited to suggest student representatives to participate in the study. A call for participants was posted on the SCoR research radiographers' network webpage and key individuals were also identified and individually contacted by the SCoR and by the research team. Snowball sampling was also used with recruited panel members suggesting others whose expertise would add value to the study.

Potential participants had to fulfil the pre-specified criteria for selection (see Table 1). A recruitment target of approximately 0.4% of SCoR membership (n=90) was set to mirror other Delphi studies.[8] Those that met the criteria in Table 1 were invited to be members of the expert panel (n=128). The panel included experts from all four UK countries and from a range of settings, including:

- public healthcare;
- private sector healthcare and;
- Higher Education Institutions (HEIs).

As much as was reasonably practicable, the panel reflected a balance of experts across specialisms, experience and geographic locations.

To maintain confidentiality and anonymity all panel members were assigned a unique participant ID number.

Data was stored in a secure electronic site file, on a password-protected network (the network was regularly backed up to ensure security and safety of data) hosted by Sheffield Hallam University.

1	Have managed diagnostic or therapeutic radiography services (i.e. head of department, deputy head of department or superintendent II)
2	Have managed diagnostic or therapeutic radiography courses in a Higher Education Institution (i.e. head of department/school/team, deputy head of department/school/team)
3	Have published papers about diagnostic or therapeutic radiography services in peer-reviewed journals
4	Have conducted research or a practice development initiative into diagnostic or therapeutic radiography services
5	Currently or have been a senior practitioner specialising in the area of diagnostic or therapeutic radiography services (consultant practitioner or advanced practitioner)
6	Currently or have been a user of diagnostic or therapeutic radiography services
7	Currently or have been in a role that contributes to the development of health policy
8	Currently enrolled on an undergraduate or postgraduate diagnostic or therapeutic radiography course
9	Willing to participate in all rounds of the Delphi prioritisation process

Table 1 Participant selection criteria

Procedure and data analysis

Ethical permission was obtained from the Health and Social Care Research Ethics committee at Sheffield Hallam University. Once individuals had been identified as passing the inclusion criteria for the expert panel they were sent an invitation to an expression of interest (EoI) form, designed using SurveyMonkey software. The EoI form included a participant information sheet with details about the study, including purpose, study sponsors, confidentiality and the complaints procedures. The EoI form also included sections to input contact details and to give consent to participate in the

study. Reminder emails were sent to non-responders on two occasions, five and eight working days after the original EoI form had been distributed. All rounds of the Delphi were conducted using the Surveymonkey online questionnaire software.

Round one

Participants were requested to list up to five research priorities for the radiography profession along with supporting statements to explain the rationale behind their choices. Participants were asked to consider prioritisation criteria when selecting their research priority areas; these were adapted by the research team from criteria used in the Chartered Society of Physiotherapy Delphi study[8] (Table 2). Content analysis was used to identify themed areas, using NVivo qualitative data analysis software (QSR International Pty Ltd. Version 10, 2012). Two researchers (HP and SH) independently analysed all completed questionnaire priorities listed in round one. These were then collated and any disagreement in terms of themes was discussed and agreed. In the round one analysis, care was taken to maintain the wording used by participants to retain validity and to ensure that the themes reflected the panel's original perspectives. Topics that were identified as not research were removed at this stage.

Does the topic address a significant need or gap in the evidence for radiography practice and/or service delivery? e.g. Consider evidence of clinical effectiveness, risk and cost effectiveness
Will the research area impact the quality of care and experience for patients, their carers, service users and members of the public? e.g. Consider the burden of the disease, number of people likely to benefit, likelihood of implementation of findings, and patient benefit
Will the research potentially impact radiography practice? e.g. Consider the likelihood of implementation of findings and how many Society and College of Radiographers members are likely to utilise the evidence
Will the research area potentially have an impact on managers, service providers, students and practitioners, and be relevant to government policy and priorities? e.g. Consider the current evidence base in relation to service delivery and cost effectiveness, likelihood of implementation of findings and how radiography services and education are likely to benefit

Does the topic area address existing or emerging technology or techniques, how those might be used currently and any potential they may have for future practice? e.g. Consider the effectiveness of new techniques over current standard practice or new applications of old modalities/techniques

Table 2 Prioritisation criteria

Round two

In round two, feedback was provided to the expert panel on round one in the form of the research topics grouped into themes, along with supporting statements provided in the original format. Round two required participants to rate the importance of each research topic using a 1 to 5 Likert scale (1 = very unimportant, 2 = unimportant, 3 = neither important nor unimportant, 4 = important, 5 = very important). Participants were asked to consider the prioritisation criteria as well as the supporting statements in the context of their own expert knowledge. Participants were given the option to score all returned priorities and where they felt their expertise was not sufficient to make a judgement, they had the option to select 'not qualified to assess this topic'. Participants were also given the option of selecting 'not an area for research' instead of selecting a rating score.

Consensus was set as being achieved when the following were met:

- a mean rating of ≥4.0;
- a coefficient of variation (CV) of ≤30%;
- ≥75% agreement (% of panel members scoring 4 = important or 5 = very important on the Likert scale).

Round three

In round three, participants were provided with a list of research topics which had reached consensus along with all supporting statements and were asked to rate each research priority area again. Consensus was established once more with the new scores. All analyses were undertaken using SurveyMonkey software, IBM SPSS version 21, and QSR International NVivo version 10.

Research themes

Following analysis of all three rounds, the final priority areas that had reached consensus (n=133) were presented to the SCoR research group members. The research group considered which key themes embodied the priority topics identified through the

Delphi consensus process. Five key themes were identified that appeared to encompass the consensus research statements (shown in Table 3).

1.	Technical innovations
2.	Patient and public experience
3.	Service and workforce transformation
4.	Accuracy and safety
5.	Education and training

Table 3 Research themes identified by members of the SCoR research group following consideration of the 133 research priorities

A mapping exercise was undertaken to identify if each priority that reached consensus in the Delphi process could be matched with one of the five themes listed in Table 3.

Two members of the research group independently matched thirty separate priorities to reach agreement on which priorities fit the research themes; the purpose being to ensure that each priority could easily be linked to one of the five themed areas.

Results

Round one

Table 4 presents the number of panel members responding in each round. The response rate for round one was 85.16%. The expert panel identified a total of 439 research priority areas in this first round that were grouped into 19 subject areas. Thematic analysis to reduce response overlap condensed the returned priorities into 325 distinct research topics that were returned to participants in round two.

Number of participants in panel	128
Round one	
Number of participants responded	109
Response rate (%)	85.6
Number of topics suggested	439

Number of topics after thematic analysis	325
Number of subject areas	19
Round two	
Number of participants responded	100
Response rate from original panel (%)	78.18
Response rate from 109 that responded to round one (%)	91.74
Number of topics reaching consensus	159
Topics from round one reaching consensus (%)	48.92
Round three	
Number of participants responded	98
Response rate from original panel (%)	76.56
Response rate from 100 that responded to round two (%)	98
Number of topics reaching consensus	133
Topics from round one reaching consensus (%)	40.92

Table 4 Data from expert panel: rounds 1 to 3

On average, panel members suggested four priority areas each in round one (mode of five and range of one to five). Of the 128 panel members, 93.75% (n=120) were radiographers (n=62 diagnostic, n=43 radiotherapy and 2 dual qualified), 3.13% (n=4) were students, 1.56% (n=2) were from other allied health professions and 1.6% (n=2) were service users. A summary of demographic information for the expert panel can be found in Table 5.

Age range	**N =**
24–35	18
36–45	28
46-55	48
56–65	14
66–75	2
Prefer not to answer	2
Missing data	16
Gender	
Male	22
Female	90

Missing data	16
Ethnic Group	
White - English/Welsh/Scottish/Northern Irish/British	95
White – Irish	4
White – any other background	5
Mixed/multiple ethnic groups – White/Asian	1
Mixed/multiple ethnic groups – any other background	1
Asian/Asian British/Pakistani	1
Black/African/Caribbean/ Black British – African	1
Other ethnic group – any other background	1
Prefer not to answer	3
Missing data	16
Area of response	
England	93
Wales	1
Scotland	9
Northern Ireland	4
Other	5
Missing data	16
Designation	
Diagnostic	62
Therapeutic	43
Dual qualified	2
Other	6
Missing data	16
Years of qualification	
1–5	4
6–10	11
11–15	15
16–20	12
21–25	14
26–30	19
31–35	12

36–40	7
41–45	2
N/A (not a radiographer)	15
Prefer not to answer	1
Missing data	16

Table 5 Expert panel demographic data

The topics identified in round one varied from general research areas to more specific research questions. Non-responders were followed up by email, with some participants formally withdrawing at this stage owing to workload or having moved jobs (n=4), and some were withdrawn for not responding before the round one completion deadline (n=15).

Round two

Round two responses from the panel were at an acceptable level (78.2%). Consensus was achieved on 159 of the 325 topic areas presented to the panel. There was some attrition of participants, with those that formally withdrew (n=2) citing the length of the questionnaire or technical issues as reasons for non-completion. Some panel members were withdrawn from the study after missing the final questionnaire deadline (n=7). The mean scores, percentage agreement and coefficient of variations (CVs) showed variable agreement from participants regarding the importance of different topics. Following quantitative data analysis, the 166 research areas that failed to reach consensus were excluded from the round three questionnaires.

Round three

Ninety-eight participants from the original sample of 128 responded to the third round questionnaire (overall response rate of 76.6%). The panel reached consensus on 133 of the 159 research priority areas presented in this round. Table 6 shows the top ten research topics prioritised by the expert panel in round three. Sub-group analyses for radiotherapy, diagnostic imaging, ultrasound and mammography, and education are presented in Tables 7-10.

Rank	Priority topic	N	Mean	% agreement	CV (%)
1	Proton beam radiotherapy, including outcomes, patient experience, techniques, cost effectiveness, delivery, training and late effects	44	4.68	100.0	10
2	Audit of survivorship and late effects after radiotherapy	54	4.65	98.1	11
3	Dose optimisation, in relation to image quality and methods for reduction for all modalities using ionising radiation	87	4.64	97.7	12
4	Adaptive radiotherapy, in relation to developing guidelines, improving treatment outcomes and reducing side effects	44	4.64	97.7	11
5	How to implement individualised patient-specific radiotherapy	50	4.60	92.0	16
6	Ensuring standard procedures are evidence-based	98	4.60	88.8	14
7	Management of acute and late side effects of radiotherapy	46	4.59	97.8	12
8	Image Guided Radiotherapy (IGRT) - development of gold standard imaging regimes and image matching techniques, and consideration of dose	44	4.59	97.7	12
9	Outcome measures for radiographer-led procedures previously radiologist-led	73	4.56	91.8	14
10	Impact of 24-7, extended day and 7 day week working	88	4.53	92.0	14

Legend:
N = number of panel members that voted on topic in round 3
% agreement = % of panel members scoring '4' (important) or '5' (very important) on the Likert scale
CV = coefficient of variation
Consensus was considered as a mean score ≥4.0, % agreement ≥75% and coefficient of variation < 30%

Table 6 Top ten topics reaching consensus after round 3 – all subjects

Rank	Priority topic	N	Mean	% agreement	CV (%)
1	Proton beam radiotherapy, including outcomes, patient experience, techniques, cost effectiveness, delivery, training and late effects	44	4.68	100.0	10
2	Audit of survivorship and late effects after radiotherapy	54	4.65	98.1	11
3	Adaptive radiotherapy, in relation to developing guidelines, improving treatment outcomes and reducing side effects	44	4.64	97.7	11
4	How to implement individualised patient-specific radiotherapy	50	4.60	92.0	14
5	Management of acute and late side effects of radiotherapy	46	4.59	97.8	12
6	IGRT - development of gold standard imaging regimes and image matching techniques, and consideration of dose	44	4.59	97.7	12
7	Data collection of patient outcomes for as wide an amount of treatment fractionation, doses and treatment sites as possible	48	4.48	89.6	15
8	Identification of patients' priorities from a radiotherapy service - what is important for them	63	4.46	92.1	14
9	Impact of NHS spending restrictions on radiotherapy service delivery	57	4.46	89.4	15

10	Targeted radiotherapy based on functional imaging	43	4.44	95.3	13

Table 7 Top ten topics reaching consensus after round 3 – Therapy sub-group

Rank	Priority topic	N	Mean	% agreement	CV (%)
1	Dose optimisation, in relation to image quality and methods for reduction for all modalities using ionising radiation	87	4.64	97.7	12
2	Outcome measures for radiographer-led procedures previously radiologist-led	73	4.56	91.8	14
3	How can we reduce the number of imaging errors?	77	4.34	89.6	15
4	What will the imaging service demands be by 2020 and how will we meet them?	73	4.32	87.7	18
5	Efficacy of diagnostic pathways	68	4.28	86.8	17
6	Radiographer-led assessment and discharge for minor injuries - evaluation of its effectiveness	65	4.28	84.6	17
7	Is tomosynthesis a viable alternative to Computed Tomography (CT) - could we replace 4 or 5 projection scaphoid series with this, and so negate the need to treat patients who have negative imaging?	26	4.27	84.6	17
8	Cost and clinical effectiveness of radiographer- led musculoskeletal services	64	4.25	87.5	16

9	Establishing the accuracy of radiographer reporting in clinical practice	65	4.23	87.7	19
10	Diagnostic reference levels need to be established for the full range of examinations for both paediatrics and adults	54	4.22	92.6	18

Table 8 Top ten topics reaching consensus after round 3 – Diagnostic sub-group

Rank	Priority topic	N	Mean	% agreement	CV (%)
1	Can the routine screening of vasa praevia at the anomaly ultrasound scan improve pregnancy outcomes?	21	4.52	100.0	11
2	Why are we still failing our babies? Persistent poor antenatal US detection rates of serious congenital heart anomalies	26	4.46	92.3	14
3	Addressing poor recruitment and retention of sonographers	61	4.36	90.1	16
4	Exploiting the potential of tomosynthesis	28	4.32	85.7	17
5	Breast tomosynthesis: use in the evaluation of difficult to visualise breast lesions in the symptomatic breast clinic	25	4.32	92.0	15
6	Should there be a more standardised approach to both performing and reporting foetal Doppler ultrasound?	25	4.24	84.0	17

7	Comparison of breast MR and contrast enhanced tomosynthesis in the diagnosis of lobular carcinoma	25	4.24	84.0	17
8	Breast tomosynthesis for screening moderate and high risk family history patients	25	4.20	88.0	15
9	The career of sonography - is a change in training required to address staff shortfall?	54	4.11	83.3	20
10	Radiographer performed mammography image interpretation	47	4.04	80.0	21

Table 9 Top ten topics reaching consensus after round 3 – Ultrasound and Mammography sub-group

Rank	Priority topic	N	Mean	% agreement	CV (%)
1	Evaluating the education and workforce requirements to meet future service needs	93	4.39	87.1	18
2	Addressing poor recruitment and retention of sonographers	61	4.36	90.2	16
3	The recruitment and retention of radiographers	93	4.27	88.2	17
	Work force/recruitment/attrition rates for radiotherapy students. How can we ensure more students are attracted to radiography (particularly therapy) and retained?	77	4.25	88.3	16
5	Identifying future skills set needs for radiographers, creating methods to obtain these and assessing effectiveness of education strategies	95	4.18	81.1	18
6	Training and educational needs for advanced radiotherapy and imaging	66	4.18	86.4	16
7	With the introduction of PET-CT, MR linacs and 4-dimensional computerised tomography do we need more diagnostic training in radiotherapy?	60	4.15	86.7	16
8	The career of sonography - is a change in training required to address staff shortfall?	54	4.11	83.3	20
9	MR linacs - what is the training requirement for therapeutic radiographers?	54	4.11	77.8	19
10	Education at all levels - how is it evolving to meet challenges of new technologies and techniques?	92	4.08	80.4	19

Table 10 Top ten topics reaching consensus after round 3 – Education sub-group

A summary of topic consensus and number of priority areas reaching consensus per topic heading can be found in Table 11.

Topic heading	**Number of priority areas reaching consensus**
1. Service improvement	8
2. Workforce	8
3. Education and training	5
4. Inter-professional collaboration	1
5. Research capacity, capability and attitudes to research	6
6. Role extension	8
7. Recruitment and retention	3
8. Patient experience	8
9. Patient safety	3
10. Radiotherapy	38
11. Survivorship	3
12. Imaging	15
13. Radiographer reporting	6
14. Radiographer commenting	2
15. Tomosynthesis	6
16. Ultrasound	3
17. General topics	10

Table 11: Final research topic headings and number of priority areas reaching consensus after round 3

Overarching research themes

The system used to assess if the research priority areas could be matched to one of the five identified research themes was a light touch process used to check alignment of priorities to the overarching themes.

Discussion

The Delphi consensus method proved a suitable method for identifying the key research priorities for the radiography profession as determined by practitioners. A total of 133 priority topics were identified that reached consensus agreement across the three round process. Delphi consensus processes often have the potential to lose participants as the rounds progress and this can often limit the impact of the subsequent outcomes. However, in this study the attrition rate between rounds was minimal and the final panel size remained high with 76.6% of the original panel still responding in round three of the Delphi process; much higher than the retention rates from the physiotherapy Delphi process where between 52-64% of panel members remained by the final round across the four panels.[8] While the consensus criteria was set with a coefficient of variation (CV) <30, across all 133 identified topics, the CV was ≤23 showing good agreement for the identified topics.

Tables 7-10 provide a breakdown of the top ten topics for four key sub-specialties, radiotherapy, diagnostic imaging, mammography and ultrasound, and education. Care should be taken when assessing the importance of the ordering of the topics as this is based on the mean score for importance. Higher mean scores may reflect greater consensus within the group of individuals that scored that topic, so lower ordered topics may simply reflect a wider diversity of opinion within those that scored the item. Hence in Table 6 many of the higher ranked top ten topics are radiotherapy or oncology focussed and this may be due to the lower number of respondents ranking these topics. In addition, the differences between mean scores in Table 6 are small and represent very small differences in panel scoring.

Finally, the five key themed areas (see Figure 1) were identified to simplify presentation of the priority areas to a wider audience. It is important to be mindful that these themes

reflect a broad overview of the 133 topics that reached consensus and primary reference should be made to the consensus topics themselves.

Conclusion

The Delphi process has provided a robust process for identifying key research priorities for the radiography profession for the next five years. Experts from the profession including service users and student representatives have identified these priorities. They provide focus for the application of funding from this point forward, enabling best use of resources for research that is applied and patient-focussed, and will take the profession of radiography forward into the next decade.

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Appendix

Table 12: All topics reaching consensus (in order of priority)				
Rank	Priority topic	Mean	% agreement	CV (%)
1	Proton beam radiotherapy, including outcomes, patient experience, techniques, cost effectiveness, delivery, training and late effects	4.68	100.0	10
2	Audit of survivorship and late effects after radiotherapy	4.65	98.1	11
3	Dose optimisation, in relation to image quality and methods for reduction for all modalities using ionising radiation	4.64	97.7	12
4	Adaptive radiotherapy, in relation to developing guidelines, improving treatment outcomes and reducing side effects	4.64	97.7	11
5	How to implement individualised patient-specific radiotherapy	4.60	92.0	14
6	Ensuring standard procedures are evidence-based	4.60	88.8	16
7	Management of acute and late side effects of radiotherapy	4.59	97.8	12
8	IGRT - development of gold standard imaging regimes and image matching techniques, and consideration of dose	4.59	97.7	12
9	Outcome measures for radiographer led procedures previously radiologist led	4.56	91.8	14
10	Impact of 24-7, extended day and 7 day week working	4.53	92.0	14
11	Can the routine screening of vasa praevia at the anomaly ultrasound scan improve pregnancy outcomes?	4.52	100.0	11
12	Data collection of patient outcomes for as wide an amount of treatment fractionation, doses and treatment sites as possible	4.48	89.6	15
13	Why are we still failing our babies? Persistent poor antenatal US detection rates of serious congenital heart anomalies	4.46	92.3	14
14	Identification of patients' priorities from a radiotherapy service - what is important for them	4.46	92.1	14
15	Impact of advanced & consultant practitioners on patient care and service delivery	4.46	91.7	15
16	Impact of NHS spending restrictions on radiotherapy service delivery	4.46	89.5	15
17	Targeted radiotherapy based on functional imaging	4.44	95.3	13
18	Advanced practitioner roles and consultant radiographer roles - making a difference to the service provided to patients	4.43	92.7	15
19	Survivorship - radiographer led self-referral late effects clinics	4.43	90.7	15
20	Motion management - to improve treatment outcomes and minimise normal tissue toxicity	4.42	95.3	13
21	Future of the profession - is the current model fit for purpose?	4.42	86.6	18
22	Radiobiology, including effects of fractionation regimes and implications of low dose bath	4.41	95.5	13
23	Impact of co-morbidities on late effects of radiotherapy	4.40	95.7	13
24	Evaluating the education and workforce requirements to meet future service needs	4.39	87.1	18
25	The use of multi-modality imaging with radiotherapy planning and treatment	4.38	95.6	15
26	Patient partnerships in radiotherapy, in relation to improvement of physical, social, psychological and spiritual support	4.38	91.4	15
27	Develop the role of advanced and consultant practitioners into new areas	4.38	89.4	16
28	Addressing poor recruitment and retention of sonographers	4.36	90.2	16
29	Development of image interpretation competencies for therapeutic radiographers	4.35	93.8	14

30	Patient experience, in relation to improving quality of life, comfort, anxiety and quality of care	4.35	90.7	15
31	Technology advances, in relation to patient safety, value for money and accuracy	4.35	86.3	16
32	Raising awareness and up to date knowledge and understanding of radiotherapy among primary care and other health professionals - particularly GPs	4.34	90.6	16
33	Radiotherapy research - how can we promote a culture of research into an often fragmented infrastructure?	4.34	90.0	17
34	How can we reduce the number of imaging errors?	4.34	89.6	15
35	SABR, including benefits, imaging protocols, toxicity, accuracy and potential for use in further sites	4.33	95.2	13
36	How to improve the research culture in our profession	4.33	89.7	17
37	Breast cancer diagnosis and treatment	4.33	86.7	16
38	Breast tomosynthesis, use in the evaluation of difficult to visualise breast lesions in the symptomatic breast clinic	4.32	92.0	15
39	What will the imaging service demands be by 2020 and how will we meet them?	4.32	87.7	18
40	Impact of advanced & consultant level practice roles	4.32	87.5	17
41	Improving patient pathways	4.32	87.2	16
42	Exploiting the potential of tomosynthesis	4.32	85.7	17
43	Minimising rectal toxicity in pelvic radiotherapy	4.31	95.6	13
44	MDT care of patients during and after radiotherapy, to provide better outcomes	4.31	93.1	14
45	Radiographer target delineation	4.30	88.4	16
46	Decision making in radiography	4.30	86.7	18
47	Patient safety - increasing safety culture, reassuring patients, improve practice and patient outcomes	4.29	89.4	16
48	Efficacy of diagnostic pathways	4.28	86.8	17
49	Radiographer led assessment and discharge for minor injuries - evaluation of its effectiveness	4.28	84.6	17
50	Role development - scope of practice, clinical and cost effectiveness	4.27	90.4	15
51	The recruitment and retention of radiographers	4.27	88.2	17
52	Is tomosynthesis a viable alternative to CT - could we replace 4 or 5 projection scaphoid series with this, and so negate the need to treat patients who have negative imaging?	4.27	84.6	17
53	On-treatment imaging, which patients should we be imaging daily and when should we use cone beam CT and when MV	4.26	90.7	15
54	Effectiveness of radiographer communication skills in imaging and radiotherapy in the context of new roles and responsibilities	4.26	89.2	16
55	Patient involvement, to improve patient experience and guide practice	4.26	87.5	16
56	Work force/recruitment/attrition rates for radiotherapy students. How can we ensure more students are attracted to radiography (particularly therapy) and retained?	4.25	88.3	16
57	Cost and clinical effectiveness of radiographer led musculoskeletal services	4.25	87.5	16
58	Investigating the use of MR imaging for paediatric radiotherapy planning and treatment	4.24	92.7	14
59	How can radiographers maximise their potential as experts in imaging and become the experts with regards to adaptive radiotherapy techniques?	4.24	87.3	17
60	Comparison of breast MR and contrast enhanced tomosynthesis in the diagnosis of lobular carcinoma	4.24	84.0	17

61	Should there be a more standardised approach to both performing and reporting foetal doppler ultrasound?	4.24	84.0	17
62	Development of more individualised targeted radiotherapy in combination with other targeted therapies	4.24	83.3	17
63	Impact of independent prescribing by radiographers	4.24	82.6	17
64	Establishing the accuracy of radiographer reporting in clinical practice	4.23	87.7	19
65	Diagnostic reference levels need to be established for the full range of examinations for both paediatrics and adults	4.22	92.6	18
66	Patient bladder and bowel preparation for pelvic radiotherapy treatments	4.22	91.1	14
67	Extending the role of radiographers into triage and discharge in emergency departments	4.22	86.7	18
68	Service delivery models - optimum use of equipment and staff resources, and assessment of the patient experience	4.22	83.3	17
69	Implementation of hypofractionated radiotherapy regimens in some disease groups	4.21	90.5	14
70	Effective communication of radiography findings, e.g. MRI scans, ultrasound imaging and x-rays	4.21	87.3	19
71	Investigating the relationship between %tumour change as shown by Cone Beam CT Scans during radiotherapy with overall survival, recurrence rate	4.20	93.3	15
72	Breast tomosynthesis for screening moderate & high risk family history patients	4.20	88.0	15
73	Potential new diagnostic tests and diagnostic test accuracy	4.20	86.8	16
74	Health economics and radiographer reporting/advanced practice	4.20	85.9	18
75	Evaluation of the effectiveness of current and emerging imaging technologies	4.20	85.1	16
76	Radiographer reporting for breast MRI, both high risk screening and symptomatic cases - research to prove efficacy	4.20	81.7	17
77	Emerging technology and techniques, in relation to quality of life studies and long-term side effects	4.19	86.0	17
78	Dementia and the challenges within radiography	4.19	84.1	18
79	Radiographer (or practitioner)-led services/service transformation	4.19	83.0	17
80	Promoting patient and public involvement in radiotherapy services	4.18	92.2	16
81	Training and educational needs for advanced radiotherapy and imaging	4.18	86.4	16
82	Evaluating the impact of centralising paediatric radiotherapy into 2 centres (when proton centres open in 2018-19)	4.18	85.0	18
83	Identifying future skills set needs for radiographers, creating methods to obtain these and assessing effectiveness of education strategies	4.18	81.1	18
84	How do radiological procedures impact upon the management of the patient?	4.17	86.1	17
85	Radiographers attitude to research and perceptions of their role in contributing to the evidence base	4.17	84.4	18
86	Increase the radiotherapy clinical trials portfolio	4.17	79.6	22
87	Effectiveness of the extended role of the radiographer in diagnostic imaging and radiotherapy	4.16	86.2	16
88	Impact of in room MRI imaging on radiotherapy delivery	4.16	86.0	16
89	Improving the publicity around radiotherapy in an effective way	4.16	80.0	18
90	With the introduction of PET-CT, MR linacs and 4-dimensional computerised tomography do we need more diagnostic training in radiotherapy?	4.15	86.7	16

91	Long term review of impact of IMRT related to integral dose received during repeated cone beam CT imaging	4.14	86.0	21
92	Research radiographers - benefit to profession & NHS	4.14	84.0	19
93	Explore different schemes and initiatives to increase radiography research capacity in the UK	4.14	82.6	18
94	Technique improvements for verification using on-treatment imaging	4.12	90.5	13
95	MRI planning	4.12	88.4	14
96	Radiographer-led breast symptomatic clinics	4.12	82.5	17
97	Understanding patient perceptions of the clinical service provided by radiographers within the clinical imaging and radiotherapy services	4.12	81.6	19
98	Investigating extension of reporting roles to more areas of imaging and to more radiographers	4.11	84.6	17
99	Effectiveness of different techniques for example - very complicated breast treatments with cardiac shielding versus deep inspiration breath hold technique	4.11	84.4	20
100	The career of sonography - is a change in training required to address staff shortfall?	4.11	83.3	20
101	Advanced practice - to improve service and encourage leadership and decision making skills	4.11	82.3	18
102	Impact of digital radiography on radiographic technique and implications for patient dose	4.11	81.3	19
103	Effectiveness of imaging and radiotherapy techniques and procedures in patients with a range of diseases, e.g. cardiothoracic, neurological, gynaecological or urological disease	4.11	80.5	19
104	Imaging in the obese population	4.11	80.0	18
105	MR linacs - what is the training requirement for therapeutic radiographers?	4.11	77.8	19
106	Has there been a measurable benefit to patients from the increase in use of imaging (CT/PETCT/MRI/etc)?	4.10	82.2	20
107	Identify the need for more clinical research radiographer posts within the UK	4.10	82.0	17
108	Weight loss during RT for head and neck cancers - when to replan?	4.09	84.4	15
109	Barriers to chest x-ray reporting by radiographers	4.09	83.3	17
110	Managing physiological motion in patients	4.09	81.8	18
111	Education at all levels - how is it evolving to meet challenges of new technologies and techniques?	4.08	80.4	19
112	Image quality optimisation in CT	4.07	86.0	17
113	Deep inspiration breath hold reproducibility	4.07	84.4	15
114	Image quality optimisation in computed and digital radiography	4.07	83.1	18
115	Role extension in radiography - what are the key obstacles and solutions?	4.06	81.1	18
116	Referral patterns, unnecessary referrals and increases in referrals	4.06	75.0	22
117	Radiographer decision making - to ensure an autonomous workforce	4.05	83.1	21
118	Capturing and using patient experience across the age range and across all modalities	4.05	80.0	17
119	The patient voice and feedback - quality of care	4.05	76.0	19
120	Optimising breast radiotherapy imaging	4.04	80.9	18
121	Radiographer performed mammography image interpretation	4.04	80.0	21
122	Optimising diagnostics requesting and reducing the burden of waste	4.04	76.1	20

123	Radiographer research capability - why do we lag behind other professions?	4.03	78.9	20
124	Whole brain radiotherapy - quality of life v side effects relating to prognosis	4.02	86.4	16
125	What is the role of diet and exercise, and are survivorship courses effective?	4.02	83.0	17
126	Adapting radiotherapy based on transit dosimetry	4.02	81.0	22
127	Review of the 4-tier structure	4.02	77.3	23
128	Radiographer commenting system	4.02	76.7	22
129	Utilisation of technology available in practice, e.g. gating and cone beam CT	4.00	83.7	20
130	Molecular radiotherapy - to develop better patient-specific dosimetry and facilitate the patient pathway	4.00	80.0	16
131	Tomosynthesis in screening, particularly on mobiles	4.00	78.6	17
132	Evaluation of different staffing models and effective service delivery models	4.00	78.0	19
133	The move to 'commenting' (PCE) and the need to audit performance and set minimum standards	4.00	75.8	21