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Editorial

Radiology Training for Clinical Oncology Trainees

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Importance of Radiology for Radiotherapy Planning

Correct interpretation of tumor and normal anatomy on cross-sectional imaging is of critical importance for radiotherapy target volume and organ-at-risk (OAR) delineation and is therefore an essential part of clinical oncology training. This is of particular relevance in the era of highly conformal treatment techniques, such as intensity-modulated radiotherapy (IMRT), image-guided brachytherapy, stereotactic ablative radiotherapy (SABR), stereotactic radiosurgery (SRS), and particle therapy. Incorrect delineation could risk target volume under-coverage or the delivery of excess to OARs and may be associated with inferior survival outcomes [1–4]. This article will summarize the evidence in favor of improving radiology training for clinical oncology trainees, discuss some recent surveys of clinical oncology trainees and the oncology registrars' forum (ORF) committee, and will describe current RCR initiatives and proposals for improving the quality of training.

Concerns About Training

The Royal College of Radiologists (RCR) Curriculum (2023) for clinical oncology specialty trainees includes an expectation for 'correct interpretation of radiological imaging for accurate target volume definition in radiotherapy planning: Capability in Practice (CiP)14,' with the provison that trainees should 'review imaging with a radiologist in cases of complexity or uncertainty' [5]. Interpretation of computed tomography (CT), magnetic resonance imaging (MRI), and positron emission tomography-computed tomography (PET-CT) in the context of radiotherapy planning is evaluated within the Fellowship of the Royal College of Radiologists (FRCR) examinations, and more detailed analysis of contouring skills has recently been introduced into the Part 2b FRCR examination.

Image interpretation skills for contouring are acquired through clinical practice and refined with senior-led feedback [6]. This process may be supported by resources such as national guidelines, clinical trial protocols, books, websites, courses, and workshops. However, there is consistent feedback from clinical oncology trainees regarding a need for more formal radiology teaching. The results of an RCR survey of UK clinical oncology trainees, published in 2018,

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reported that "radiological anatomy continues to be largely self-taught by over 80% of trainees" and that approximately one-third of trainees reported the provision of "inadequate" radiology teaching within their training programme [7]. In addition, in the corresponding 2021 survey, 50% of trainees reported "insufficient time allocated to radiotherapy planning," which could limit the practical application of image interpretation skills [8]. Furthermore, in an RCR Post Certificate of Completion of Training survey of new consultants in 2015, respondents frequently reported a lack of dedicated training in cross-sectional imaging during their training and the potential impact of this on their radiotherapy contouring skills [9].

These previous surveys have highlighted consistent concerns regarding training in image interpretation but have not provided detailed information concerning this. We therefore performed a dedicated survey for clinical oncology trainees as well as surveying practice in different deaneries via the ORF committee.

Surveys

Clinical Oncology Trainee Survey 2021

We conducted a survey of UK clinical trainees attending the RCR's Annual Trainee Oncology Meeting (ATOM) conference in June 2021. Fifty-three of 71 (75%) trainees anonymously responded to the survey. Every training grade was represented. Table 1 summarizes the findings.

Confidence was compared between junior (ST3-5) and senior (ST6-7) trainees. Confidence (where respondents agreed/strongly agreed) for CT and PET-CT was higher amongst senior trainees (mean average 77% versus 52%), but confidence was similarly low for MRI, with only 33% junior trainees and 31% senior trainees indicating confidence in MRI interpretation.

Trainees were asked to indicate which training methods from a prepopulated list they would like to see included in clinical oncology training. A dedicated radiology course (selected by 91% of respondents) and attendance at clinical radiology specialty trainee teaching sessions (85%) were the most commonly selected training methods. Inclusion of radiology teaching in FRCR Part 1 courses (60%), a dedicated clinical radiology placement for clinical oncology trainees (47%), and self-directed e-learning (47%) were less commonly chosen. The 20 free-text comments advocated the need for more radiology-specific teaching.

Oncology Registrars' Forum Survey 2024

Representatives from 15 out of 20 deaneries in the UK responded to the free-text survey question in January 2024: 'please describe current and/or planned radiology training opportunities in your deanery' [10]. As demonstrated in Figure 1, categorized responses varied widely.

While 6 out of 15 deaneries had no regular radiology teaching, there were examples of excellent practice, including joint regional teaching days with radiology trainees, regular weekly teaching with radiology consultants, access to ST3 radiology anatomy teaching, and interactive radiology training days, led by radiologists with the use of individual workstations. At least one deanery had measures in place to increase radiology teaching.

Discussion

The results of previously reported surveys and more recently the two surveys highlighted in this article confirm the unmet need for radiology training for clinical oncology trainees in the UK, with some examples of excellent practice. The survey of UK clinical oncology trainees at ATOM 2021 indicated a concerning lack of confidence regarding MRI, even among senior trainees. This could reflect the complexity of MRI interpretation and inadequate understanding of different MRI sequences. MRI is a key component of the diagnostic and response assessment processes for multiple disease sites, and correct interpretation of normal and pathological structures is of critical importance for radiotherapy contouring. This is of even greater significance in an era of increasing use of MRI-guided radiotherapy, including MR-only planning pathways and the MR linac [11].

The survey results are consistent with the findings of prior surveys of UK clinical oncology trainees and new consultants [7–9]. In the USA, radiation oncology trainees have highlighted similar concerns regarding training in image interpretation, with 61% 'only somewhat confident' in their radiology skills [12]. In Germany, formal dedicated time within radiology or nuclear medicine departments is generally not foreseen, but trainees can organize rotations within these departments to gain greater experience. In the Netherlands, trainees can also choose to use part of their training time to develop their imaging competencies, even though, again, training in radiology or nuclear medicine is not compulsory. The current clinical oncology workforce challenges within the UK National Health Service, which include vacancies within clinical oncology training

Table 1
Statement responses regarding confidence in CT, PET-CT, or MRI image interpretation

Statement	Strongly agree	Agree	Neither	Disagree	Strongly disagree
I feel confident identifying the GTV on CT	7 (13%)	28 (53%)	14 (26%)	4 (8%)	0 (0%)
I feel confident identifying normal organs on CT	6 (11.5%)	32 (60%)	8 (15%)	6 (11.5%)	1 (2%)
I feel confident interpreting PET-CT scans when contouring	6 (11%)	26 (49%)	9 (17%)	11 (21%)	1 (2%)
I feel confident interpreting MRI scans when contouring	2 (4%)	15 (28%)	13 (25%)	19 (36%)	4 (7%)

Abbreviations: CT = computed tomography; GTV = gross tumour volume; MRI = magnetic resonance imaging; PET-CT = positron emission tomography-computed tomography.

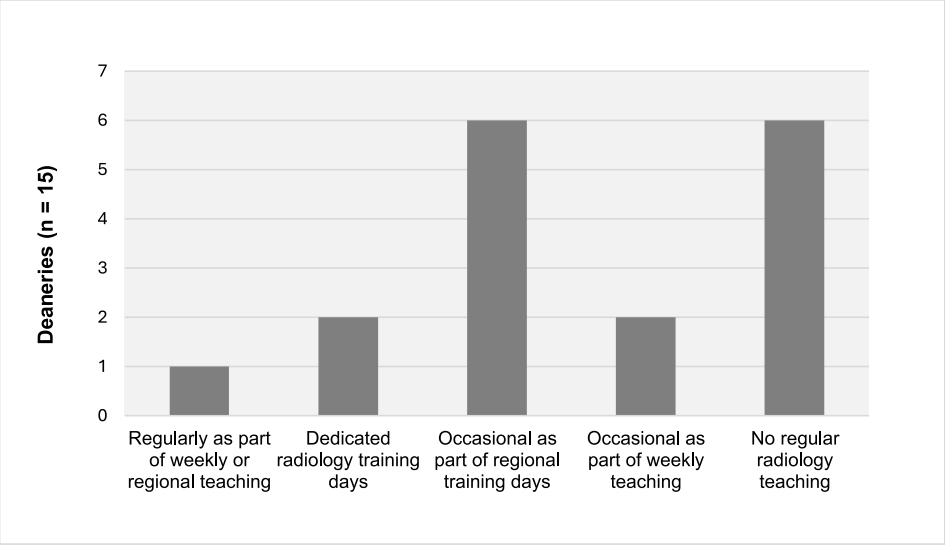

Fig 1. Oncology Registrars Forum responses regarding radiology training opportunities in their UK deanery.

programs, may mean that dedicated placements for clinical oncology trainees within radiology departments are not considered feasible [13,14].

Limitations of the survey of trainees at ATOM 2021 are that it may not be fully representative of all UK clinical oncology trainees due to the relatively low sample size, and may represent trainees who are more invested in their training, thus overestimating confidence. However, the response rate at the ATOM conference was high (75%) and the sample size and results are comparable to similar studies [7,8]. A detailed analysis of the specific reasons for lack of confidence was not elucidated from this survey and would be an interesting area for future investigation. It is also worth noting that confidence does not equate with competence and that the relationship between contouring skill and confidence level at the trainee level would be worth further assessment.

Current RCR resources and initiatives

- **Royal College of Radiologists Oncology Learning Hub Webinar Series**: In response to this survey, we designed a free program of radiology webinars over the summer as part of the **RCR Summer School 2022**.
- **Development of the RCR Learning Hub**: The learning hub is currently undergoing full restructuring and reorganization to allow updating of resources, better navigation, and access to resources and cross-site learning.
- **Royal College of Radiologists Radiology Learning Hub: Radiology—Integrated Training Initiative (R-ITI)**
- **RCR contouring workshops** [15,16]
- ***ARENA* (Assurances in Radiotherapy through Education and Assessment)** *project—contouring cases available on the RCR website*

Proposals for Improvement

The RCR has several existing initiatives that can support the acquisition of skills in image interpretation and radiotherapy planning (see **Box**). There are a number of ways in which we can continue to improve on the current initiatives:

External open-source radiological resources (e.g., websites) used by radiologists are to be included in the ORF section of the RCR website. A dedicated course on cross-sectional imaging was a popular proposal among respondents to the survey, and this could have an online modular design based on tumor type, cover both normal and pathological anatomy, and include principles of MRI and other imaging modalities. The RCR Learning Hub may be able to host such online resources, and this could build on previous courses such as the Radiology for Radiotherapy Planning sessions at previous the RCR and ATOM conferences. However, embedding regular radiology teaching into current clinical oncology training, already shown to be successful and feasible in some deaneries, is likely to be needed for the continued development and refinement of image interpretation competences. Use of joint teaching sessions for clinical radiology and clinical oncology trainees avoids duplication, promotes efficient use of teaching resources, and supports collaborative working between the two specialties. It may also foster a greater understanding of oncological practice for radiology trainees.

Conclusions

This article has summarized two recent surveys indicating a lack of confidence in cross-sectional image interpretation amongst clinical oncology trainees, with considerable variation in training opportunities across the UK. There are several potential routes to further improve training, including an improved library of resources in the RCR Learning Hub, and greater integration with clinical

radiology teaching programmes and development of dedicated cross-sectional image interpretation courses. Close collaboration between the RCR Faculties of Clinical Radiology and Clinical Oncology are essential in the design and conduct of any training initiatives, and it will be important to evaluate the impact of any interventions on trainee performance and confidence.

Author contribution

Radiology Training for Clinical Oncology Trainees.

1 guarantor of integrity of the entire study—MB, FS, PS, RC.

2 study concepts and design—MB, FS.

3 literature research—MB, FS.

4 clinical studies—NA.

5 experimental studies/data analysis—MB, FS, AP.

6 statistical analysis—MB.

7 manuscript preparation—MB, FS.

8 manuscript editing—MB, FS, AP, GR, ET, PS, RC.

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Conflict of Interest

The authors declare no conflict of interest.

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